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TELEPHONE ENGINEER

Volume XVII CHICAGO, JUNE, 1917 Number 6

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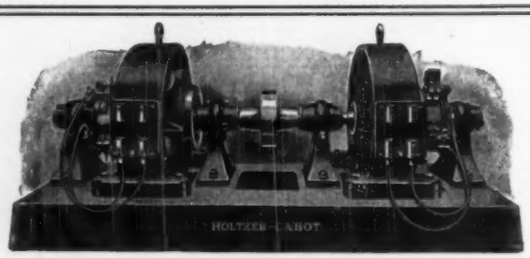

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VOL. XVII CHICAGO, JUNE, 1917 NO. 6

The Industry's Contribution to War

THE telephone industry is more fortunately situated in some respects than most lines of business in the matter of paying war taxes. The telephone tax is both more easily understood and more easily collected from the public than some taxes. There is no opening for argument as to who pays the tax—the company or the subscriber. The people are already familiar with the five-cent toll tax on call at fifteen cents and higher, and the five per cent levy on service bills presents few complications.

There is some natural criticism from users, however, of the flat five-cent rate on toll calls. It is obvious that this tax goes to opposite extremes as a matter of percentage. It amounts to 33 1-3 per cent on a fifteen-cent toll. It is only one-third of one per cent on a fifteen-dollar toll. The average of all toll messages is only a little more than fifteen cents—therefore the average tax levy will amount to practically thirty per cent. It appears that the same financial result might be attained with greater satisfaction to toll line users by a percentage tax which would allow the transcontinental talker to pay his proper share and so relieve, at least slightly, the business man who talks every day to his suburban home and to his customers or creditors a few miles away.

On another page we print the suggestion of an Illinois man that hotels and clubs, which enjoy a large profit on room calls, be made to give up a portion of these gains in the interest of the nation. This phase of the telephone tax question apparently is still unconsidered.

But aside from the taxes which it will collect and be responsible for, the telephone industry is taking a tremendous part in war activities. It is deliberately breaking its industrial ranks that the military ranks may be properly supplied with experienced telephone men. It is devoting large portions of its service and the labor of its experts to the government needs. It is taking the same big part in official activities that the telephone instrument itself has come to take in military activities.

With the telephone corporation in war time the term "public service" reaches its full meaning. It comes to signify service to the whole of the people, and therefore to the nation. The mere subscriber becomes incidental. We realize at last that the function of the telephone operator is not alone service to those who rent business or residence telephones, or to those who drop coins in a pay station slot. It is service to the United States of America.

State Versus Municipal Utility Control

WHEN the Illinois Supreme Court decided, a short time ago, that the State Public Utilities Commission had entire control of all public utilities in the state, and that therefore even the biggest cities (which means Chicago) had no control, there was manifested a considerable amount of amazement and chagrin. The chagrin may have been justified; but why the amazement we do not know.

Practically all of Chicago's utilities are intercity, and therefore distinctly state services. This is most directly true of the Chicago Telephone Company, which serves a considerable

portion of northern Illinois under one name and another. The city of Chicago gets the big end of the service merely because it is the cost concentrated center of population, and not because its geographical boundaries have anything to do with the company's telephone plant.

No telephone user confines all of his business and social intercourse to the corporate limits of any city, and no telephone company which confines its service to similar limits can claim to give adequate service. There is no reason, indeed, why an operating telephone company should be expected to pay any attention to city limits in the extension of its plant, while state lines are definite and perpetual, city lines are never permanently fixed, and sometimes move every few years.

There is every possible argument in favor of state control of telephone utilities and very little favorable to city control. There is a bill now in the Illinois house which aims to "restore" former powers to "cities whose population is in excess of 200,000," which, of course, means just Chicago. The word "restore" in this case simply means that the state commission wuold be deprived of all its jurisdiction over one particular corner of the state.

If necessity so indicated, it might be possible to adopt a modification of the New York State system, providing for two commissions, the first district embracing Chicago and its territory, and the second district taking care of the rest of the state. No past or present situation, however, indicates any requirement for such an arrangement in Illinois.

Chicago is entitled to its representation on the state commission. It is well prepared for legal presentation of any case before the state commission, where its importance and size will have due weight. There is no logical reason why it should be the sole exception to the generally accepted and perfectly satisfactory system of state control of public utilities.

Chicago's home rule bill has no features to recommend it to either the people or the utilities.

Telephonize All the Telegraph Lines

THE public has already been warned that the exigencies of the time, the shortage of material and the withdrawal of a percentage of skilled labor are quite likely to embarrass telephone service to a perceptible degree. This is declared to be especially true of the many toll lines which are now working to their capacity.

The telephone using public will know little or nothing about the use of toll lines for military purposes; but it may be safely asserted that the traffic for such use will be very heavy and will appreciably diminish the availability of long distance plants for commercial purposes.

It is unnecessary to remind the telephone men that telegraph lines and telephone lines are now not only interchangeable but practically identical, and that their simultaneous use for both purposes is every day practice.

The American Telephone and Telegraph Company has a system of telephone lines which it uses also for telegraph purposes. The Postal Telegraph and Cable Company has a system of telegraph lines which it desires to use for telephone purposes. The Postal people have, indeed, given formal notification to various state commissions of their readiness to relieve the congestion of telephone toll business, which they are obviously in a position to do without additional line construction.

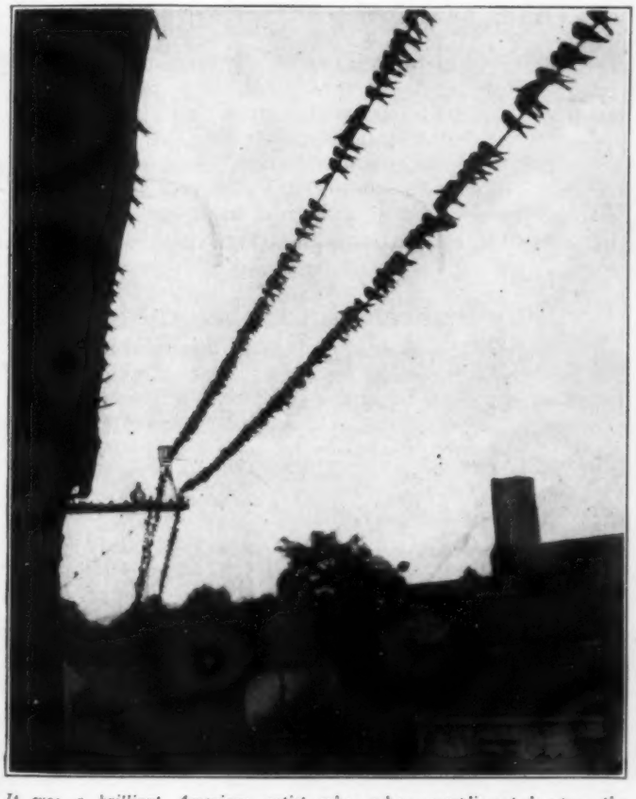
In a time when all communication facilities must be worked to their utmost efficiency, it is a reckless waste of ready resources to allow highly developed telegraph wire systems to continue without the application of telephone compositing. Every telegraph line in the country can carry telephone messages with absolutely no interference with the telegraph function, and should be made to do so.

The fact that the Postal's ambition to operate telephones is purely commercial and competitive has no bearing on the situation, which partakes of the nature of an emergency. Questions as to the theory of natural monopoly of public utilities are distinctly out of place now, if they are ever appropriate. Conditions demand the last ounce of co-operation in the development of all resources, and will not permit those obstructive tactics of competition which, in time of peace, might be entirely ethical.

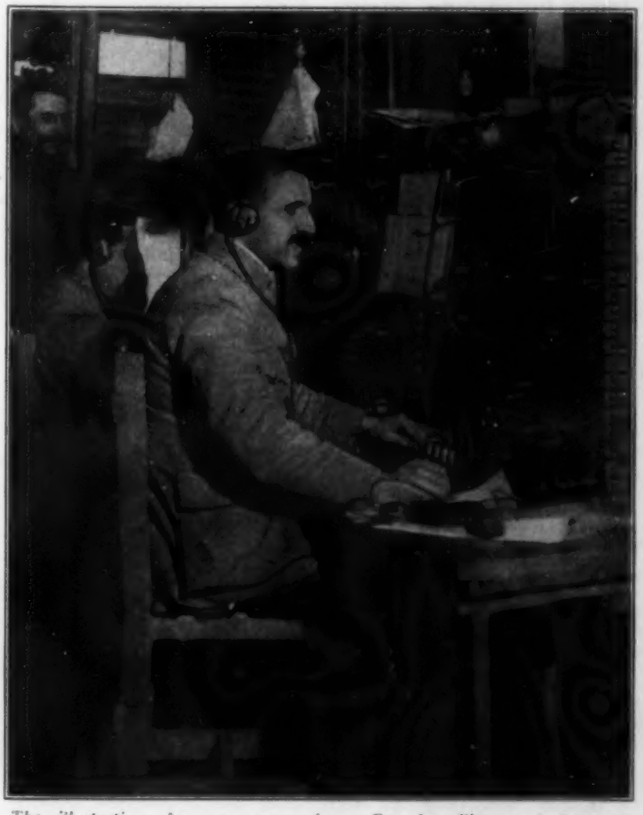
If the Postal Company should find the path to proper use of the equipment it has already installed effectually blocked by state and local authorities, the solution would lie in government recognition of its aims. The justice of its position is so obvious that there should be no difficulty in obtaining an order for the telephonic equipment of all its telegraph lines.

Showing How the du Pont Powder People Solve the Telephone Pole Hole Question.
Using a Common Earth Auger to Prepare a Small Hale that Shall Later Become a Full Sized Pole Hole.

Planting a Stick Loaded with Dynamite in the Auger Hole.—When It Has Been Exploded the Pole Will Go In Nicely.



It was a brilliant American artist who, when complimented upon the realism displayed in one of his paintings, remarked quietly: "Yes, Nature is creeping up!" This photograph, which has just reached us from France, shows a remarkable similarity to a picture which was published in the "Illustrated London News" just about a year ago, from the brush of one of our well-known artists. It is in the very heart of a shelled and ruined town that these swallows are seen, quietly perched on war-telegraph wires before migrating, as though the turmoil of battle were a thousand miles away. The picture offers one more proof of the way in which (natural) history repeats itself regardless of man's doings.—London "Illustrated War News."



The illustration shows a corner in a French military telephone exchange somewhere in the Somme district, with soldier-operators at work. The seats are occupied by relays of men continuously, day and night. Intervals when messages are not being transmitted are few. Brigades, divisions, army corps, armies, groups of armies, are so linked, and keep touch with one another and with General Army Headquarters and the Ministry of War in Paris. Scores of exchanges work lines which radiate between the Somme on one side and the Southern Vosges on the other. That seen here, as the patterned wall-paper and the Venetian blinds suggest, has its quarters in what was formerly a private dwelling-house.—[French Official Photograph.]—London "Illustrated War News."

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Support the Liberty Loan

R. Goodwyn Rhett, of Charleston, S. C., president of the United States Chamber of Commerce, calls upon the business men of the country to give whole-hearted support to the Liberty Loan. Mr. Rhett said:

"Every unit of our national life must serve the flag. When the nation faces a supreme test involving not only the defense of our honor and rights, but the liberty of the world, idlers have no place in our institutions. Wealth must serve as do the men who offer their lives at the front, and the men who serve, no less patriotically, back of the line.

"To honor the gift of the fathers of the Republic is to prove ourselves worthy of the glorious heritage. To fail is to confess our degeneracy; to acknowledge that we are unworthy sons of noble sires; to sink in shame the traditions of Washington, Jefferson and Lincoln. We will not fail.

"Popular support of the Government is a factor in victory no less than soldiers and supplies. The test of popular support of the Government in this war for liberty and democracy lies in the response to the Liberty Loan of 1917. Upon the business men of the nation, as perhaps no other unit of our national life, depends the success of the bond issue.

"There is every inducement to the business men of America to make the Liberty Loan a success. It offers the advantage of safe investment as well as the opportunity for patriotic service. I have no doubt that if the Liberty Loan were without many of its attractive features as an investment, the business men would be in the front rank of its supporters. The Liberty Loan combines profit, prosperity and patriotism.

"The thought I have in mind was expressed by Secretary of the Treasury McAdoo in his letter to the banks and trust companies. 'Practically all of the proceeds of the Liberty Loan, whether advanced to foreign governments or expended directly by departments of the United States, will be spent in this country in payment of indebtedness heretofore or hereafter incurred.'

"The meaning and importance of that to the subscribers to the Liberty Loan is clear. The United States is not asking for subscriptions to a $5,000,000,000 bond issue to be sent out of the country. Every dollar is to remain here and while we are aiding our allies by loaning funds to them at a lower interest than they could get otherwise, we are aiding ourselves by providing new demands upon all of our industries. That means increased demands for labor, more requirements in raw material and a greater market for food products.

"In the affairs of nations as in business, principles must be honesty of heart and purpose. There can be no doubt that the United States in entering this war is reaffirming its fidelity of those principles. But a nation is no stronger than its weakest part. Each unit must perform its function. Without this our intentions will avail nothing and our efforts will be a mockery. I do not doubt for a moment that the business men of the United States will do their share.

"The ability of the United States to meet a financial problem involving an extension of $5,000,000,000 in credit to the government is so well recognized as to make further reference to it unnecessary.

"The Chamber of Commerce of the United States has pointed out to the merchants and manufacturers how they may become leaders in the success of the Liberty Loan, by making it possible for their employees to purchase the bonds by small weekly payments. The importance of such service to millions of employees who might not otherwise be enabled to purchase Liberty Loan Bonds cannot be overestimated. This is a national service. It makes the employer and worker co-operative participants in the patriotic service of financing the war."

Chicago Independent Would Quit

Permission to surrender its franchise and "junk" its automatic telephone system was asked of the city of Chicago May 10 by S. W. Tracy, president of the Chicago Tunnel Company, in a letter presented to the city council gas, oil and electric light committee.

Mr. Tracy stated that the company would be willing to pay compensation to the city for this privilege, but the amount will have to be determined by the city council. The council passed an ordinance on December 20, 1916, forfeiting the franchise.

Operation of the telephone system has emptied the company's strong box, Mr. Tracy said, and hampers its transportation business. Mr. Tracy stated that the city's failure to indicate what it proposes to do regarding the disposition of the telephone system has placed the company in an embarrassing situation.

"The telephone business of the company is and always has been conducted at considerable loss and is serving no useful purpose to the people of Chicago," he said. "The transportation business of the company is also being conducted at a loss, but the service performed in transporting merchandise and other materials through the tunnels is of great importance to the people.

"More could be done in this direction if the company's finances permitted of its constructing additional terminals and purchasing additional equipment. The operation of the automatic telephone plant has drained every dollar of the company's funds and exhausted its credit so that it is unable to raise money from any source whatever until such time as it can discontinue the operation of the telephone system.

Pay Increase for Enlisted Men

Telegraphic advice from Washington contains authority for the following new rates of pay for the enlisted forces of the Signal Corps:

	Old Rate	*New Rate*	*Increase*
Master Signal Electrician	$75.00	$81.00	$ 6.00
Sergeant, first class	45.00	51.00	6.00
Sergeant	36.00	44.00	8.00
Corporal	24.00	36.00	12.00
Horseshoer	30.00	38.00	8.00
Cook	30.00	38.00	8.00
Private, first class	18.00	33.00	15.00
Private	15.00	30.00	15.00

This authority carries the following provision:

"Provided that the increase of pay herein authorized shall not enter into the computation of continuous service pay. Twenty per centum foreign service increase does not accrue on increases herein mentioned."—L. D. Wildman, *Major, Signal Corps.*

A small elderly man on entering the dry goods store inquired for the use of the telephone. He stepped over to the telephone and commenced to turn the crank but could not get any response from central. Upon investigation one of the clerks discovered he had turned the crank of the "pencil sharpener" which happened to be near the telephone.—*Toll Line Flashes.*

Loaded Telephone Circuits

Characteristics, Testing and Design of Loading Coils and Field Testing Sets

BY W. N. FURTHMAN

This article describes the loading of a telephone circuit, either for aerial or cable services; phantom or non-phantom loaded circuits; the spacing of aerial and cable coils; degrees of loading and method of spacing coils; field testing to determine accuracy in loading and quality of coils produced by manufacturers. It also treats of the design and construction of high efficiency loading coils that made transcontinental service successful.

SINCE 1900, the year in which Dr. Pupin invented the method of loading a telephone circuit, there has not occurred any improvement in the fundamental principle he invoked. There has, however, been considerable improvement in the apparatus and testing equipment and in the design of the loading coils.

Naturally, in a problem involving so many scientific laws, it is essential that in so far as possible every effort should be made in the field to prove in results. In the design and use of field testing apparatus for loading coils all of the precepts of Dr. Pupin's invention must be followed and properly applied. It is necessary, therefore, thoroughly to understand the methods that are applied in loading telephone circuits before an intelligent method for testing and improving such circuits can be devised.

It is not the purpose of this article to review all of the mathematical laws involved in the loading of a telephone circuit. It will be necessary, however, to tabulate a brief synopsis of such laws as apply to the design and application of field testing apparatus. The formula for the attenuation of a telephone circuit excluding the effect of conditions on the ends of such a circuit is:

$$a = \sqrt{\tfrac{1}{2} \sqrt{(R^2+p^2L^2)\ (S^2+p^2c^2)} + \tfrac{1}{2}(S\,R - p^2Lc)} \quad (1)$$

in which the symbols have the following:

a = attenuation constant per unit length.
R = resistance per unit length.
L = inductance per unit length.
c = capacity per unit length.
S = conductance per unit length.
$P = 2\Pi$ (frequency).

The attenuation constant is the efficiency measure of the circuit; for a circuit having a known amount of current impressed, the amount of that current at any point may be determined as follows:

$$i = Ic - ma \quad (2)$$

i = the current at any point.
I = the initial current.
m = the distance from the initial point of the line to the point where current (i) is to be calculated.

Equation (1) may be simplified

$$S = O$$

as S represents leakage and dielectric losses that are made as small as possible, and have therefore small effect on general results.

Equation (1) should therefore become

$$a = \sqrt{\frac{p\,c}{2}\,(\sqrt{R^2 + p^2\,L^2} - p\,L)} \quad (3)$$

It will be immediately clear that as the inductance of the circuit is increased, the attenuation will be reduced.

The wave length in a telephone circuit may be computed as follows:

$$\frac{(4) \qquad 2\Pi}{\sqrt{\tfrac{1}{2}\sqrt{(R^2+p^2L^2)\ (S^2+p^2c^2)} - \tfrac{1}{2}\,(S\,R - p^2\,L\,c)}}$$

The symbols in (4) being the same as in (1).

In using this equation one must always consider the reaction of the inductance because it affects the wave length. The highest frequency which gives clear transmission is 800 periods per second. It is necessary also that the spacing of the coils should be very uniform. Loading of a telephone circuit especially increases the efficiency of an underground cable on account of the presence of a large amount of capacity in relation to the other phases of the circuit.

Loading of a telephone circuit brings about substantially the same results as are obtained in applying a transformer at the receiving end of a power circuit to obtain high reactance and to place high potential apparatus at the transmitting end. The main and principal difference is in the length of the line when considering a telephone circuit. Telephone currents are of high instead of low frequency and a telephone line is long where a power current is comparatively short. Inasmuch as the reactance at the end of a telephone circuit is not applicable to the sending end of the line it does not have this power circuit advantage and it becomes essential to distribute the reactance to obtain the same relative good result. This is termed the "spacing of loading" of a telephone circuit.

The principles involved in loading aerial and cable circuits are the same. However, because the capacity of a cable is high and the inductance small, the cable characteristics are the reverse of aerial wire conditions. This condition necessitates different spacing of the coils and thus brings about different dimensions both mechanical and electrical.

The loading of a circuit, either underground or aerial, brings at the end of the circuit an effect termed reflection losses. These losses occur whether the loaded line is connected to substation apparatus or a non-loaded line. Terminal transformers have been designed to overcome these losses. This repeating coil or transformer differs from the standard coil in that it has more turns on one winding than on the other. It is used in the same way as in light practice. The ratio of the windings varies with the conditions to be met approximately 1 to 1.4 or 1 to 2. These terminal transformers reduce the terminal losses about one-half.

The heavier the degree of loading, the heavier the degree of terminal losses. The increasing effect of leakage as the degree of loading is increased also has a limiting effect.

The medium loading of cable circuits is more efficient up to lengths of four miles than a heavier degree of loading. Beyond that limit a heavier degree is more efficient, although up to 12 miles the difference in efficiency is not so very great. For a circuit five miles in length, No. 19 gauge cable with medium degree of loading is as efficient as a 16 gauge conductor unloaded. For

a length of 12 miles a loaded No. 19 gauge is as efficient as a No. 13 gauge conductor not loaded. In calculating the efficiency of underground cables it has been found more satisfactory to use a large gauge of wire such as Nos. 16, 14, 13 and 10 gauge, rather than to overstep the bounds of heavy loading.

The results for loading aerial conductors have been equally as good as the loading of cable conductors. One of the principal difficulties in loading an aerial conductor is due to insulation resistance. This difficulty has been overcome by means of a porcelain petticoated insulator. While transmission on aerial conductors under damp conditions is not now as good as in dry climates, no condition is met in transcontinental service that brings about any material difference in transmission.

The results of all tests which have been made up to date on loaded cables have been collected by comparing and co-ordinating the results. Values for the transmission efficiency of the different classes of circuits loaded in various ways have been obtained, which are probably more accurate than the results of any particular set of tests on a single cable.

The total transmission loss in any connection involving loaded cable is made up of the attenuation and the current supply losses in the terminal loops, the attenuation loss in the loaded cable and the reflection losses at the junction of the loaded line and non-loaded circuits. The attenuation loss in a loaded cable is independent of the character of the terminal loops and of the transformers used. The reflection loss is dependent upon the char-

Illustrating Features of Design of Unbalanced Capacity Test Set Necessary to Secure Strength, Long Life, Safety and Ease of Operation with Convenience in handling.

acter of the loaded line, that is, its impedance; upon the length of the terminal loop, and upon the character of the junction between the loaded and non-loaded circuits, that is, whether a terminal transformer is used or not. From tests which have been made, it can be said that terminal loops of No. 22 B. & S. gauge and No. 16 B. & S. gauge cable have practically the same influence on reflection losses as loops of the same length in No. 19 gauge cable. Knowing the character of the terminal loops, the impedance and resistance of the loaded cables and whether transformers are used or not, it is possible to foretell with reasonable accuracy the transmission efficiency of the circuit.

An analysis of the loadings employed in installations of loaded cables show that loadings can be made to conform to one of the three following types without any material sacrifice of economy or efficiency: First, a light loading of .05 henry per mile obtained with a spacing of about 2.6 miles; second, a medium loading of 0.1 henry per mile obtained with a spacing of about 1.75 miles; third, a heavy loading of 0.2 henry per mile obtained with a spacing of about 1.25 miles. The line impedances corresponding to these three loadings are, respectively, about 900, 1,200 and 1,800 ohms, the mutual capacity of the cable being taken at 0.060 microfarads per mile.

In engineering work No. 19 B. & S., No. 16 B & S., and No. 13 B. & S. gauge cables are regarded as standard sizes for telephone work, intermediate sizes being not generally used. The three loadings referred to above are sufficient to provide an economical construction for any ordinary case. On this basis the relative efficiency of the several circuits, assuming no terminal reflection losses, are as follows:

Gauge	*Non-Loaded*	*Light Loading*	*Medium Loading*	*Heavy Loading*
No. 19 B. & S.	1.00	2.2	3.0	3.7
No. 16 B. & S.	1.0	4.2	5.3	6.2
No. 13 B. & S.	2.0	7.5	8.7	9.1

A fair figure in considering terminal transformer is an initial cost of about $30.00 per transformer, and a life is estimated at ten years. This gives an annual depreciation of 10 per cent, which is the figure assumed for loading coil depreciation.

The theory of the terminal transformer as a device for reducing reflection losses is based on the fact that reflection only takes place at the junction of construction which differs in impedance. If it were possible to secure ideal transformers, that is, those in which there would be no loss in transformation, it would evidently only be necessary to make use of transformer with windings having impedance equal to the impedance of the lines to be connected in order to completely eliminate all reflection loss at the junction of two different constructions.

On account of the energy loss in transformation which an actual transformer involves, it has been found that for both medium and heavy loading a transformer with an impedance ratio of approximately 4 to 1 is the most efficient when loaded circuits are to be connected to non-loaded circuits.

The fact that the operation and efficiency of the transformer is not affected by connecting the important points of the two windings together either by means of a conductor or by the introduction of a condenser makes the terminal transformer an easy means of introducing signaling apparatus into the circuit.

In general the terminal transformer whether connecting a battery supply coil or merely used as a reflection reducing apparatus should be located at the junction of the loaded and non-loaded construction. Where these coils are to be used in connection with loaded toll lines which at their terminals connect to non-loaded switching trunks it has been found that the efficiency of the transformer as a reflection reducing device is not materially lessened by placing the transformer at the local office and connecting the loaded toll lines direct to the non-loaded switching trunk provided the length of the latter does not exceed one or two miles. Beyond this point the efficiency of the transformer as a reflection reducing device rapidly diminishes and with very long non-loaded switching trunks it has been found that its efficiency when located

at the local office is not greater than that of a regular toroidal repeating coil.

In this connection it is to be noted also that, when used on non-loaded lines, the loss occasioned by the presence of an inequality coil is materially greater than that occasioned by an equality coil. For this reason the installation of inequality coils at the local office ends of non-loaded switching trunks which are to be connected with both loaded and non-loaded toll lines should be carefully considered and should not be adopted if the additional loss which their presence will involve on the connection over non-loaded circuits can not be permitted.

In general it will not be found advisable to install terminal transformers at the junction of loaded cable and non-loaded aerial toll lines. As the loaded aerial portions of such lines is likely to be long and as the efficiency of the terminal transformer in reducing reflection diminishes with the length of the portion of the non-loaded circuit.

It has been found that when such non-loaded circuits exceed the equivalent of 5 or 6 miles of No. 19 gauge cable the presence of an inequality coil at the junctions of the loaded and non-loaded portions of the circuit results in little or no gain in transmission. If the lengths of loaded cable were long and the aerial portions of the circuit short, the presence of such a coil might prove advantageous. As to the matter of reflection losses resulting from the presence of a terminal repeating coil in a cord circuit connecting two loaded trunks with one-half the regular spacing from the switching office to the first loaded coils on either side, it is found that that reflection losses are practically zero. Since the terminal repeating coil has an equality ratio of impedances its introduction in a loaded circuit at any points should produce little or no reflection loss, and while any loss it might exceed would be a minimum with the coil at the center of the section. The spacing of the first coils on either side of a switchboard point one-half of the regular section away from the switchboard is primarily for the purpose of giving a full section at the point two loaded circuits are connected together, rather than with the idea of placing the repeating coil in the center of such a section.

In the matter of loaded cables which connect to non-loaded aerial lines the coils should be placed with regard to the central office, the first being one-half the regular spacing from the office as in the case of trunk cables, and the other coils regularly spaced toward the junction of the open wire lines; the exact location of the last coil on the terminal cable is not of great importance provided the open wire circuit is long If the open wire circuit is comparatively short it is best not to have the last coil nearer than one-half the regular spacing from the junction point.

In cases where loaded terminal cables connect to loaded aerial circuits, the first coil on the circuit should be spaced one-half the regular spacing from the central office, the other coils on the cable being uniformly spaced toward the junction with the loaded aerial lines. The spacing between the last coil on the cable and the first coil on the loaded aerial circuit should be such as to give 7,000 loads per second. As the first section of a loaded aerial line is usually the fuller section, this would require the last loading coil on the cable being one-half the regular spacing from the junction point.

In determining the best loading to be given terminal and local trunk cables to obtain the highest transmission efficiency, the following results have been obtained:

(1) Toll lines ending in the terminal cables to be either non-loaded air wires, heavily loaded cable or loaded air wires (coils spaced 8 miles).

(2) Local trunks to be 0, 2.5 or 5 miles in length.

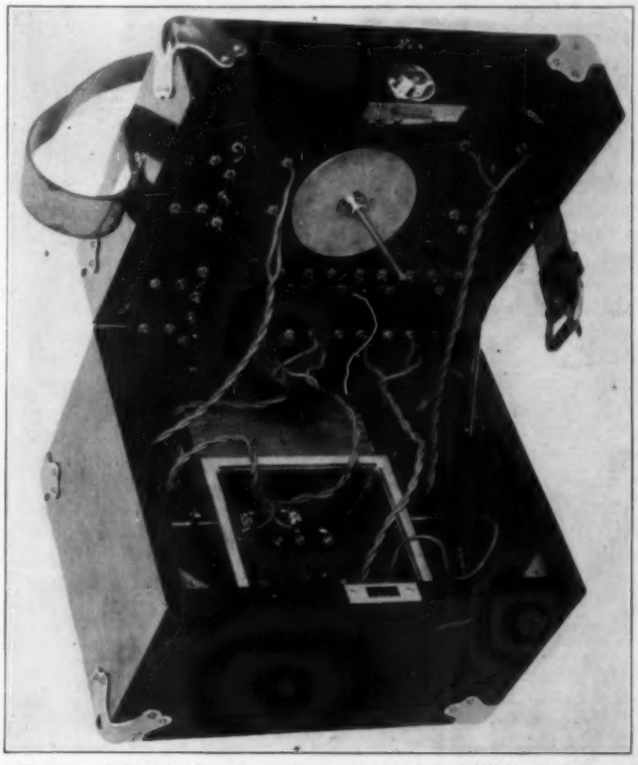
(3) Terminal cables to form part of a through toll connection.

Subscribers' loops equivalent to 2.5 miles of No. 19 B. & S. gauge cable; inequality repeating coils between the local trunk and subscriber's loop and repeating coils at the toll office:

	Local Trunk	
	1.5 Miles	*5 Miles*
Medium loading on trunk	0.125 mile per coil	0.5 mile per coil
Heavy loading on trunk	0.1 mile per coil	0.1 mile per coil

On account of the large reflection losses, heavy loading on both terminal cable and local trunk is less efficient than either medium on both or a combination of medium and heavy loading, and has not, therefore, been considered. The choice between medium loading throughout and medium loading on the local trunks with heavy loading on the terminal cables depends upon the nature of the toll lines connected to the terminal cables. Where the majority of the toll line connections are over non-loaded aerial line, medium loading throughout will prove in, since it affords better transmission when the terminal cables are less than 17 or 18 miles in length.

Where, however, the long haul business is done mainly over heavily loaded toll cables or over loaded aerial lines, heavy loading except in the case of 0 trunks

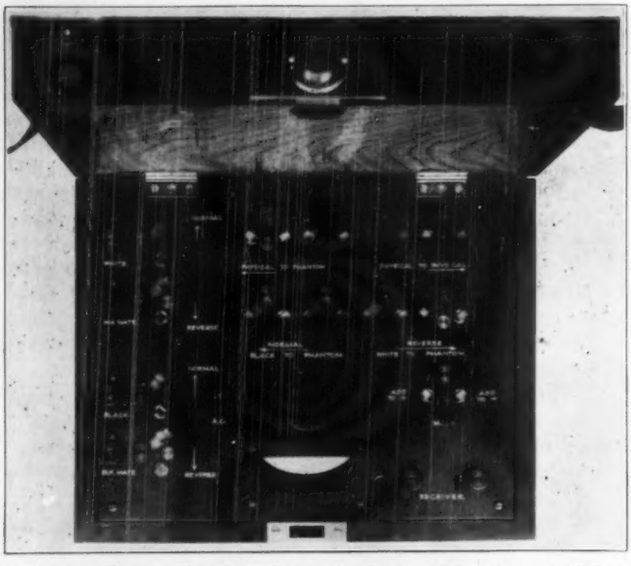


Unbalanced Capacity Test Set. Illustrating Method of Wiring Switches and Coils and Mounting Apparatus.

or 2.5 miles light loaded local trunks and light loaded terminal cables connecting to non-loaded aerial lines, light loading or combinations of light and medium loading are generally poorer than all medium loading. The combination of light loading on the local trunk and medium loading on the terminal cable has practically the same efficiency as an all medium loading when the local

trunk does not exceed 2.5 or 3 miles in length—this irrespective of the character of the toll line.

Considering the terminal cables as included in a through toll connection, heavy loading is more efficient than medium loading when (*a*) the toll lines are heavily loaded cable or loaded aerial line—(*b*) one part of the toll line is heavily loaded cable and the other loaded aerial line. Under these conditions the heavy loading is from 0.58 to 1.10 miles better than the medium for lengths of the inserted cable from 5 to 20 miles. When the toll



Unbalanced Capacity Test Set. Illustrating Design of Switches and Methods of Operation.

line is a non-loaded aerial line, medium loading on the inserted cable is from 0.61 to 0.10 miles better than heavy with cable varying from 5 to 20 miles in length—when the inserted cable is over 20 miles long, heavy loading is most efficient.

Applying these results to the condition where the ultimate plan requires that the toll lines radiating from the city be carried either in heavily loaded cable or in loaded aerial line, the heavy loaded terminal cable and medium loaded local trunks prove in on even the shortest terminal cables (5 miles). The value of a 1 mile gain in transmission efficiency on a 100 mile circuit is worth approximately $1,000 per circuit which corresponds to an annual charge of $10 a circuit for each 0.1 mile gain. The gain from using heavy loading, the warranted charge and the difference in annual charge between heavy and medium loading on the terminal cables with medium loaded local trunks from 2.5 to 5 miles in length, are given in the following table:

Length Terminal Cable—Miles	*Gain from Heavy Loading*	*Warranted Charge*	*Number Coils Heavy*	*Number Coils Medium*	*Difference in Annual Charge*
5	0.25	$25.00	4	3	$ 4.50
10	0.37	37.00	8	6	9.00
15	0.50	5.00	12	9	13.50

For 0 local trunks the corresponding figures are:

Length Terminal Cable—Miles	*Gain from Heavy Loading*	*Warranted Charge*	*Number Coils Heavy*	*Number Coils Medium*	*Difference in Annual Charge*
5	0.07	$ 7.00	4	3	$ 4.50
10	0.19	19.00	8	6	9.00
15	0.31	31.00	12	9	13.50

Where toll lines are in open the gain from using medium rather than light loading on the terminal cable, the warranted charge and the difference in annual charge for the two loadings are given in the following table. No. 12 N. B. S. wire has been assumed for the aerial circuits. Under these conditions the warranted annual charge for a 0.1 mile gain is $10 as before. For No. 8 B. W. G. the warranted charge is considerably higher. Medium loaded local trunks are assumed since they prove in for all toll lines in heavily loaded cable or in loaded aerial lines. As a large number of the toll lines leaving cities where long terminal cables are required will doubtless be in one of these two constructions ultimately, this assumption seems reasonable.

Length Terminal Cable—Miles	*Gain from Heavy Loading*	*Warranted Charge*	*Number Coils Medium*	*Number Coils Light*	*Difference in Annual Charge*
5	0.20	$20.00	3	2	$ 4.50
10	0.46	46.00	6	4	9.00
15	0.72	72.00	9	6	13.50

For the case of 0 local trunks light loading on terminal cables connecting to open wires gives better transmission than medium loading when the terminal cables are less than 10 miles in length. For terminal cables 15 miles in length medium loading proves in as indicated:

Length Terminal Cable—Miles	*Gain from Heavy Loading*	*Warranted Charge*	*Number Coils Medium*	*Number Coils Light*	*Difference in Annual Charge*
15	0.24	$24.00	9	6	$13.50

Heavily loaded terminal cables and medium loaded local trunks prove in over other combinations when the toll lines are in heavily loaded cable or loaded aerial line.

With medium loaded local trunks from 2.5 to 5.0 miles in length, medium loading proves in on terminal cables under 20 miles in length when the toll lines are in non-loaded aerial wire. For 0 local trunks it proves in when the terminal cables exceed about 12 miles in length.

Light loading, on both terminal cables and local trunks, is more efficient than other combinations only when the toll line is in non-loaded aerial wire and when terminal cables less than 8 miles in length are connected to 2.5 mile local trunks or for terminal cables less than 10 miles in length with 0 local trunks.

As part of a through toll connection, medium loading on the terminal cables is more efficient than heavy only when the connecting toll lines are in non-loaded aerial wire.

For any loaded cable the total loss in transmission is made up of two parts, viz., an *attenuation loss* which is a constant of the cable independent of terminal condition, and a *reflection loss* the amount of which is dependent both upon the constants of the cable and upon the terminal conditions. If the cable is properly loaded the *attenuation loss* is dependent upon the four line constants, the effective series resistance and inductance, the mutual capacity and effective leakage conductance. If there are irregularities in the line itself, the *attenuation loss* proper might be increased by reflection at the points where these occur. The *attenuation loss* is in every case independent of the terminal conditions. The *reflection loss* is dependent upon a constant of the loaded cable, known as the *line impedance* and upon the "terminal conditions." For any given cable the *reflection loss* is dependent only upon the terminal conditions. The problem has been: (1) Between the constants of the loaded cable and the *attenuation loss* to find a relation which will hold for all ordinary underground cables and which will enable one to compute the *attenuation loss* in any proposed case. (2) Between the line constants, terminal conditions and the *reflection loss* to find such a relation as will enable one to readily compute the *reflection loss* for any proposed loaded cable installation under any given terminal conditions in which it may be used.

As the transmission test comparisons were made

between the loaded cables and non-loaded No. 19 cable, all results have been reduced to standard No. 19 cable, having a resistance of 88 ohms and a mutual capacity of .060 microfarad per mile.

To determine the numerical value of the attenuation coefficient it is necessary to assume a value for the *mean telephonic attenuation* of the standard cable as 0.115, a value which corresponds to a frequency of 800 periods per second. The *attenuation loss* in terms of the No. 19 cable is given in column 3 of Table 2, while the attenuation coefficient is computed in column 4 of the same table. Employing these values of the attenuation coefficient it is possible to compute what may be called the "dissipation constant" M. The values of this constant are given in column 5.

COMPUTATION OF ATTENUATION LOSS OF LOADED CABLES IN TERMS OF NON-LOADED NO. 19.

The values of x, viz., $x_1\ x_2$—$x'_1\ x'_2$—$x''_1\ x''_2$—$x''_1{}'\ x''_2{}'$, in the following table represent the lengths of non-loaded No. 19 cable, which under the different terminal conditions, A, B, C & D give transmission equal to that over lengths $y_1\ y_2$—of loaded cable under corresponding terminal conditions.

TABLE 1.

Terminal Conditions	*A*	*B*	*C*	*D*
Loaded Cable	*Equivalent Length—Non-Loaded*			
y_1	x_1	x'_1	x''_1	$x''_1{}'$
y_2	x_2	x'_2	x''_2	$x''_2{}'$
y_n	x_n	x'_n	x''_n	$x''_n{}'$

If $y/$ is the difference between any two values of y and x is the difference between the two corresponding observed values of x in any column, i e., under constant terminal condition, the attenuation loss of the loaded cable per mile in terms of No. 19 is $\frac{x}{y}$. If the weight to be given to any value of this ratio when computing from a large number of measurements the attenuation loss is directly proportional to y, the sum of the total number of weighted ratios is $\frac{x}{y} \times \frac{y}{K}$. In forming this sum all possible values of $\frac{x}{y}$ are to be taken. The average value of these weighted ratios will be $\frac{x}{y}\,\frac{y}{K} = \frac{x}{y}$. This quantity may be assumed to represent the attenuation loss of a loaded cable in terms of No. 19.

COMPUTATION OF THE REFLECTION LOSS OF LOADED CABLES IN TERMS OF NON-LOADED NO. 19.

Having computed the attenuation loss by the method above outlined, the reflection loss was computed as follows. Denote the attenuation loss per mile by A. Then the attenuation loss for the different lengths of loaded cable is $y_1, A = A_1,\ y_2 A = A_2, -y_n A = A_n$. The reflection loss under condition A is then—

$$(x_1 - A_1) + (x_2 - A_{2n}) \ldots\ldots\ldots\ldots (x_n - A_n).$$

Similarly it can be computed for the other terminal conditions B, C & D.

COMPUTATION OF DISSIPATION CONSTANT M.

Let L = total inductance per mile.
C = total mutual capacity per mile.
R_{1000} = total effective series resistance per mile at 1000 periods per second.
A = observed attenuation coefficient.

Then K = line impedance $= \frac{L}{C}$ (approximate).

If the attenuation cofficient of any loaded cable is written as

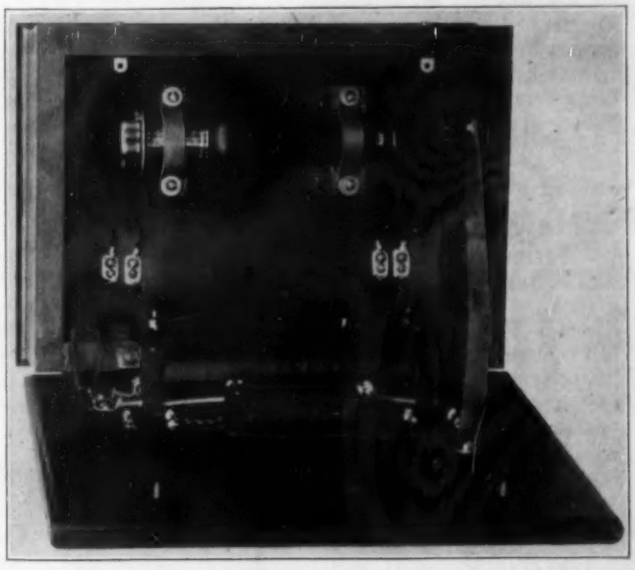
$$A = R_{1000} + m\,L\ X\ \frac{1}{K}$$

$$m = \frac{2\,K\,A - R_{1000}}{L}$$

Mutual Capacity per Mile Mfds.	*Self-Inductance per Mile Henries*	*Terms of No. 19 Cable Miles*	*Dissipation Line*			*Reflection*	
			Numerical Coefficient	*Constant*	*Imp.*	*Zero Term Loop*	*Zero Terminal No. 2 Mile Terminal Loop*
0.068	0.608	0.238	0.0274	66	2940	11	8.3
0.068	0.608	0.246	0.0283	75	2940	12.6	8.0
0.064	0.128	0.0963	0.0110	121	1410	6.5	4.0
0.070	0.179	0.345	0.0396	160	1600	5.2	..
0.070	0.212	0.168	0.0193	58	1740	7.3	4.7
0.057	0.102	0.1005	0.0116	6	1340	7.8	4.0
0.057	0.047	0.146	0.0168	68	910	4.0	0.9
0.065	0.178	0.316	0.0364	123	1655	7.5	3.6
0.063	0.200	0.149	0.0171	59	1780	7.9	4.4
0.070	0.205	0.155	0.0178	58	1720	7.0	3.0

FIELD TESTING OF LOADING COILS, CASES, AND DUPLEX CABLE.

The most important tests that are made in the field are those required for determining the correctness of the loading points and capacity unbalance. No matter how efficient the field testing sets, or experienced the testers may become, the results are not satisfactory because a proper source of the desired high frequency cur-



Howler Set Used With Unbalanced Capacity Testing Sets.

rent is not obtainable. The factory tests that are made for crosstalk, capacity unbalance, inductance and effective resistance require a frequency of 890 and 1780 p. p. s. The field tests for these requirements are made with dry batteries. Induction coils and an interrupted source of tone supply. It is a fallacy therefore to assume that the laboratory testing requirements specified for the factory product can even be approximately duplicated in the field. The importance, then, of the tests made in the factory cannot be over-estimated and every effort should be made to maintain the highest possible standard, even though the apparatus required is very

expensive and the care in carrying on the tests and check tests adds materially thereto. It will also be clear that it is highly desirable so to design the coils and duplex cable as to maintain their high standard of quality after they are placed in service. The statement that such highly scientific apparatus must to all intents and purposes be fool proof, will be somewhat surprising. The more so perhaps when it is realized that the most careful safeguards against inefficient operation and lightning do not fulfill all of the required conditions. In a discussion of the design and uses of the repeater and the high efficiency loading coil, the writer will endeavor to show that such a statement is not only not overdrawn but that the apparatus has, as a matter of fact, been developed and is now in service.

One of the most important tests made in the field is that for crosstalk. The crosstalk tests that are made in the factory cover only the crosstalk found in the loading coils and the cable stub attached to the case of the loading coils. The tests made in the field show the actual amount of crosstalk occurring during the conversation under actual line conditions.

The crosstalk tests made in the factory are accomplished by means of an artificial line circuit of 1200 ohms inpedance. The factory tests for crosstalk do not therefore represent all line conditions, since crosstalk varies inversely as the impedance of the test circuit. A test set of low impedance gives crosstalk comparatively large in magnitude and it may therefore be more accurately measured. The crosstalk in a subscriber's line may exceed an impedance of 1200 ohms as used at the factory and the importance of the test under actual service conditions becomes apparent.

In order to have some definite unit of comparison of crosstalk, it has been found convenient to express the crosstalk in any case in millionths of the current which flows from a standard talking set into a universal shunt having about the same impedance as a long length of non-loaded open wire circuit.

(To be continued.)

New York Bill Forbids Rubbering

Listening in on telephone wires in New York state will be regulated by Supreme Court orders in the future if Gov. Whitman signs the bill introduced by Senator Charles F. Murphy, Republican, of Brooklyn. This bill met much opposition in the legislature, but Senator Murphy was able to get it through both houses on the plea that it should be made impossible to repeat the "listenings in," which were common during the charities investigation in New York City.

The Murphy bill makes it a misdemeanor for any one to use any device or method to overhear a conversation on a private or public telephone line without the consent of at least one of the parties. It is provided, however, that the police commissioner of New York City or the district attorney of a county may apply to a supreme court justice upon an affidavit.

If the justice is satisfied that the facts warrant listening in and that privileged communications will not be intercepted he may issue an order in the nature of a warrant to be served upon the telephone company, which must co-operate with the public official.

Police Commissioner Arthur Woods is opposed to the Murphy bill upon the ground that it would be unwise to put such a law upon the statute books at this time to hamper either the police department or the secret service in their efforts to detect spies and unearth conspiracies.

The Telephone Tax

Proposition to tax telephone messages under the war bill is not a new one. Toll messages have been at different times taxed for revenue purposes and with little resulting curtailment of service.

The proposal now advanced is more sweeping in application in that not only toll messages but exchange service as well is to be taxed.

American Telephone in 1917 will have about $200,000,000 gross business from exchange revenues and more than $75,000,000 from toll and long distance service. The proposed 5 per cent tax on exchange service would bring in approximately $10,000,000 of revenue. In collecting, the tax would be added to the monthly bill of the individual user.

The five cent tax per message on toll conversations involving 15 cents or more is not susceptible of such easy calculation. The Bell system handles yearly about 250,000,000 long-distance or toll connections. If the five-cent tax applied to only 50 per cent of this number, it would produce $7,500,000 of revenue.

Collectively, therefore, it would seem as if the new tax bill as now contemplated would produce $17,000,000 to $18,000,000 of revenue from the Bell system alone. This is about 6 per cent of the estimated 1917 gross.

Taking the country as a whole, it is fair to assume that the telephone message tax will produce $22,000,000 to $23,000,000.

The effect of the law would probably be to slow up telephone expansion to some extent. But this in some respects would be a blessing in disguise.

The telephone companies in previous experiences have passed these Federal taxes directly to the consumer and are expected to do so in this instance. The expense of collection is considerable and this expense must necessarily be absorbed in the operating costs of the companies.

New York's Signal Volunteers

It was announced May 6 that the New York Telephone Company has completed the organization of the volunteer reserve signal corps companies which have been formed to offer their services to the government.

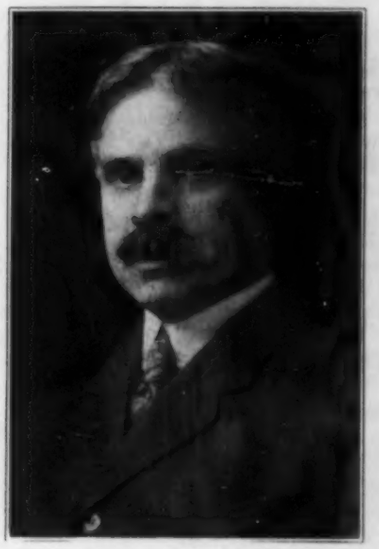
Under a plan recently announced by the company, 2,871 telephone men signified their intention to enlist in the volunteer signal corps. The examinton of these men and the formation of the permanent organization has been going on rapidly under the supervision of Lieutenant Colonel Hartmenn, U. S. A., signal officer, eastern department, and 400 men of the very best type have been selected to make up the first contingent.

John J. Carty, chief engineer of the American Telephone & Telegraph Company, and senior major, Signal Reserve Corps, U. S. A., is in charge of signal reserve work for the Bell Telephone Company. H. H. Shearer of the New York Telephone Company has been commissioned as major in the signal reserve corps in charge of the New York company military organization.

The Bell system will furnish twenty-five companies of expert telephone and telegraph men for signal work. Of these the New York company will furnish five from its Manhattan-Bronx and Westchester divisions, one from its Long Island division, and one from its New Jersey division. A company has also been made up from the Albany, Syracuse and Buffalo districts.

President George W. Robinson.

Vice-President Harold L. Beyer.



Director William Fortune.

G. W. Robinson Now Association President

Directors of U. S. I. T. A. Put St. Paul Man at Head and Make William Fortune Director

MONDAY, May 14, 1917, at a regular meeting of the board of directors, George W. Robinson, president of the Tri-State Telephone and Telegraph Company of St. Paul, Minn., was elected president of the United States Independent Telephone Associatoin. His election followed the reading of a letter of resignation from Charles Y. McVey, who, because of recent election to the presidency of the Ohio State Telephone Company, felt that he could no longer give proper attention to the presidential duties of the association. Mr. McVey's resignation was accepted with regret, and he was accorded the privilege of nominating his successor. His nomination of Mr. Robinson was at once seconded by J. B. Edwards, Chicago, and his election was unanimous. He accepted with the condition that there be no changes in the working force of the association.

To succeed Mr. Robinson as vice-president, Harold L. Beyer of Grinnell Iowa, was nominated by H. D. Critchfield, Chicago, and the nomination seconded by Mr. McVey. Mr. Beyer was unanimously elected.

D. S. Parker, Pomona, Cal., offered by letter his resignation as a member of the board of directors of the association. His resignation was accepted.

William Fortune, president of the Indianapolis Telephone Company, was nominated by President Robinson as a director to succeed Mr. Parker. The nomination was seconded by A. F. Adams, Kansas City, and the election unanimous.

Retiring President Charles Y. McVey, Now President of the Ohio State Telephone Company.

Forty-one applicants for membership in the association were accepted upon Secretary Vivian's recommendation.

Major Leonard D. Wildman, chief signal officer of the central department U. S. A., and Captain John A. Kick of the signal corps, a former TELEPHONE ENGINEER contributor, addressed the meeting on the work of the signal corps.

Resolutions were passed conveying the appreciation of the association to Mr. McVey and its approval of the officers' promptness in tendering co-operation to the government. Vice-President F. B. MacKinnon explained the tax bill to an interested audience.

The McVey resolution, drawn by Messrs. Beyer, Fisher, Bean, Reber and Robinson, read as follows:

Whereas, Charles Y. McVey, by reason of his election to the presidency of the Ohio State Telephone Company, has found it necessary to resign as president of this association, and such resignation has been reluctantly accepted this day by its board of directors; therefore, be it

Resolved, that while we regret exceedingly to lose the services of Mr. McVey as the leader of the association, we fully appreciate the magnitude of the additional burdens and duties which have been imposed upon him by his company and the motive that prompts the action he has taken, and that we tender to Mr. McVey our hearty thanks for the conscientious and valuable services he has rendered the association in the high office of its presidency, and in leaving it that we assure him of our personal regard for him and our best

wishes for his continued and increasing prosperity and success.

There were present at the meeting:

A. F. Adams, Kansas City, Mo.; Terry W. Allen, Jackson, Tenn.; F. L. Beam, Mt. Vernon, Ohio; W. H. Bryant, Mobile, Ala.; H. L. Beyer, Grinnell, Iowa; J. C. Casler, Dallas, Texas; H. D. Critchfield, Chicago; J. B. Edwards, Chicago; H. F. Farwell, Bloomington, Ill.; E. B. Fisher, Grand Rapids, Mich.; Geo. R. Fuller, Rochester, N. Y.; H. L. Gary, Kansas City, Mo.; E. D. Glandon, Pittsfield, Ill.; W. F. Goodrich, La Crosse, Wis.; S. M. Heller, Louisville, Ky.; F. B. MacKinnon, Washington, D. C.; W. Roy McCanne, Rochester, N. Y.; C. Y. McVey, Columbus, Ohio; Albert Parlett, Bristol, Tenn.-Va.; H. Linton Reber, St. Louis, Mo.; G. W. Robinson, St. Paul, Minn.; W. J. Uhl, Logansport, Ind.; W. S. Vivian, Chicago; F. H. Woods, Lincoln, Neb.

"Business Must Go On"

Active support of the nation in the preparation of all electrical systems for the added demands brought by the war was pledged by the Society for Electrical Development at its annual meeting in New York, May 8, by the following resolution:

Whereas the President in a proclamation to the people of the United States has urged the conservation of all resources and the devotion of all energies to the sole purpose of bringing victory to the arms of the nation in the war upon which it has so justly entered;

Resolved that this society, at its annual meeting, pledges to the President its patriotic support of all measures which he may take in upholding the dignity and honor of our country and the rights, property and persons of its citizens on land and sea;

Resolved that America's success in helping to win this war depends not alone on its ships or its food supply, but first of all upon our ability to keep the wheels of mercantile business going.

Resolved that the business of this country must go on, and we pledge our active support to the movement by which every business man in this country agrees to hold up his link in the chain of mercantile enterprise, including the preparation of all electrical systems for the added demands, both military and industrial, which may be made upon them.

In line with its resolution the society is mailing a poster to its members which bears the following:

BUSINESS *MUST* GO ON

America's success in helping to win this war depends not alone on its military forces, or its ships, or its food supply. It depends, first of all, on our ability to keep the wheels of mercantile business going. In the months to come will be heard all about us the grumble of the pessimist. It will be said that trade is slackening, that there are food famines, coal famines, freight congestion, labor shortage, business stagnation. Those will be the days for the electrical industry to stand together as one man, and boost for prosperity.

We must be up and doing! We must co-ordinate and concentrate to push business. We believe that business must go on. We believe there are strong, optimistic men enough in the business fabric of this natiton to keep it going! This republic has been built up through faith in itself.

This is not our first crisis. In other years men have fought side by side to save many a situation in business and in war, because they believed in each other. Confidence in ourselves, plus "Yankee ingenuity," have given to this nation an ability possessed by no other on the face of the globe—the ability to land squarely on our feet in any upheaval.

We of the electrical industry look to these days as our supreme opportunity to make good business better. We believe that as never before people are coming to recognize electric service, appliances, motors as economic necessities of home, workshop, store, office and farm. We pledge our active support to the movement by which every business man in this country agrees to hold up his link in the chain of mercantile enterprise. The business of this country must go on. Will you help?

To aid in organizing the industry a committee was appointed composed of A. K. Baylor and W. A. Layman, representing manufactures; J. R. Strong and Ernest McCleary, representing contractors; W. H. Johnson and J. E. Montague, representing central stations; W. E. Robertson and Fred Bissell, representing jobbers, and James H. McGraw, chairman.

The committee is thus composed of two representatives of each interest in the electrical industry. These two men constitute a sub-committee, the duty of which is to ascertain what their particular branch of the industry wishes the Society for Electrical Development to do for them. Having ascertained this, a meeting of the committee on organization of the industry will be held at the offices of the society. This committee will then discuss the various suggestions and formulate plans to be submitted at a meeting of the board of directors of the society which will be held for the purpose of receiving, considering and acting upon the suggestions made by this committee.

Minnesota House Moving Law

The following law, recommended by the Minnesota Independent Telephone Association, has been enacted by the state legislature:

Section 1. Any person, firm or corporation moving or causing to be moved, any building or structure upon, across or along any public road, street, alley or highway, whether within or without any city, village or borough of the State, shall so move such building or structure as not to unnecessarily interfere with, damage or destroy any bridges, trees, hedges, fences, telephone or electric power poles, wires, or cables upon such road, street, alley or highway.

Sec. 2. Whenever it shall be necessary to displace or temporarily remove any guard rails on any bridge, or any fence, telephone or electric power poles, wires, or cables to permit the moving of any building or structure upon, along or across any such public road, street, alley or highway, the person, firm or corporation owning or maintaining such fence, poles, wires or cables, shall not be required to displace or temporarily remove the same nor shall aany guard rails on any bridge be displaced or removed until the reasonable costs of such displacement or temporary removal have been paid or tendered by the person, firm or corporation, requiring such displacement or temporary removal; Provided, however, that nothing in this Section shall apply to any work being done upon any such public road, street, alley or highway by or for any municipality, nor to the moving of any building or structure 18 feet in height or less within the limits of any incorporated city.

Sec. 3. This act shall take effect and be in force from and after its passage and approval.

Approved April 20, 1917.

Listening on Telephones

It is, of course, as much a breach of good manners to listen to your neighbors talking over the telephone as to put your ear to the keyhole. Some allowance may be made for lonesomeness. There may be a desire to hear the human voice, rather than to acquire information. Even so, you may have seen a forlorn old man or woman looking wistfully at a party of young people chatting and giggling; age seeking to warm its shrivelled hands at the fire of youth. However, the Ontario government is going to stop it, if the arm of the law can extend so far. One man took the law into his own hands. In a telephone conversation with an acquaintance he alleged that there had been a fire at the village store, and there would be a grand offer of bargains in damaged goods. On the appointed day the store was thronged by eager bargain-seekers; but there was no sale, for there had been no fire. The two who conversed about the fire were wags in collusion. Others had listened at the phone and spread the news of coming commercial opportunities. They fell victims to curiosity, to credulity, and to the universal human love of a bargain. Perhaps the new law will be enforced by no heavier penalty.—*Toronto Star.*

Khaki at the Switchboard

"Idler" Tells the Telegraph and Telephone Journal What it Means at the British Front

THE days of the war pass on—slowly or swiftly as the mood of man varies. And as the hand of Dawn draws aside the curtains of the night, each day reveals some new phase of the greatest tragedy of all time. But it is a sombre drama—the more tragic, perhaps, because of its relentless avoidance of color. Purple and scarlet and gold, the waving of plumes and the splendor of armor—these glories were spread across the scene when of old the rage of battle shook the world's stage. And now all is khaki. The War and Science have conspired to kill the poetic god of battle, and to produce a strange monster whose tentacles reach through every faculty of the warring nations.

From its very inception the war made a difference to the ordinary routine of telephone exchange work, but the effects, until recently, were, in a manner, intangible. The voices of commerce and society had become somewhat altered in tone, and there mingled with them a new voice, peremptory and commanding. Now, however, comes a sudden change, and the war grows more palpable. Men in khaki have invaded the exchanges and peacefully taken their seats at the switchboards. The powers that rule our daily lives—that is to say, the military potentates—have decreed that the soldier shall be trained in the gentle art of telephone exchange operating, and, lo, the steel helmet gives place to the head receiver, and the bandolier to the breast transmitter.

With a careful solicitude for the suitability of things in general and for the susceptibilities of the great British public in particular. the department lays down certain laws as to the class of men that may be admitted to training. Naturally, they must be intelligent, but they must also keep their buttons and their boots clean, and they must not have pronounced accents—either Welsh or Scotch. There is no known case of a Welsh accent; but somewhere on the north-east coast of England, the sensitive ears of subscribers will have to bear the polite request of "Number please?" rendered in accents reminiscent of the charmed land beyond the Tweed. Surely the department must know that the ubiquitous sons of Caledonia are difficult to suppress. Whether this Scotsman's accent is pronounced or whether the local ear is quite as sensitive as might be, is a problem perhaps involving undersirable comparisons, but one thing is certain, there has as yet been no complaint received, so the matter may conceivably be allowed to rest.

Alike in one way—that they have fought and bled—these soldier-men who have come to be trained in exchange working are drawn from a wonderful variety of walks in civil life. Clerks there are, not a few; and miners, hairdressers, bricklayers, school-teachers, a hotel-keeper, a solicitor, and a policeman may walk in procession into an exchange.

The military authorities seem to have a strong predilection for ten-days' courses of instruction, whether the subject be map-reading, gunnery or telephony; and, consequently, the potential operators were subjected for the standard period of time to preliminary initiation into the mysteries of "home" jacks, calling indicators, plugs, multiples, pegs and all the awe-inspiring paraphernalia that is gathered together in a telephone switchboard. The initiation ceremonies were endured by the novices with a surprising amount of patience and interest. Even the opal code did not unduly daunt their spirits. The correct methods of pronouncing and repeating numbers aroused something like enthusiasm; and standard expressions—well, there was some difficulty in judging whether or not these beautifully turned phrases—usually spoken "with a rising inflection"—would be acceptable to men who had doubtless been accustomed to that fuller and freer flow of language which uses up such an astonishing supply of dashes when modern artists, novelists, and poets essay a character study of Tommy Atkins. A lecture room, a blackboard and chalk are thing that an officer commanding can arrange to supply at almost any hour of the day, but note-books are apparently not easily produced. These adjuncts of memory were requisitioned for the commencement of studies, but had not come to hand when the course finished. Now, the men had a way of finding little things to make life more bearable in a manner that surprised the lay mind. Thus, on a cold day when the supply of coal for the lecture room had run short, there was soon found an old door which did not look particularly aged, and a splendid fire was kept going all the afternoon. Yet this faculty of discovery did not seem to extend to note-books. Notes were certainly made, however, and answers to questions were handed in, on many varieties of paper. Incidentally, the note-paper bearing a red triangle and the initials of the name of a well-known institution seems to be equally suitable for discursive remarks on telephony or love.

The really practical training commenced when the men were drafted into the selected exchanges. "Listening in" was, as usual, the first step towards operating, and this exercise must be rather wearisome even to the most enthusiastic aspirant. One man certainly found it so. The supervisor watched him indulgently for a time while the receiver of his hand-set wandered aimlessly from one shoulder to another and from the crown of his head to a position suitable for stifling a yawn. But the supervisor is a campaigner of experience and an absolute mistress of tactics. She provided him with a head-gear set and the soldier was soon making valiant endeavors to find a required number in the multiple. Another man quickly staked out a sort of claim on the trunk junction board, and could scarcely be persuaded to transfer his attentions to the needs of subscribers. A sturdy Yorkshireman confessed that he was "always slow at taking a thing in" but that "Once I do it's there for life;" and the Scotsman answered inquiries as to how he was getting on with the laconic, "Oh, brawly."

The men on certain duties bring their rations with them, and when sympathetic supervisors were cautiously introduced to the army sandwich, they refused to recognize it even as a casual acquaintance. Cries for "something to be done" were raised, and quite persuasive arguments had to be used before the ladies were convinced that the district manager could not appropriately make suggestions to the army commissariat. When

this fact was realized, however, the inevitable happened, and the men from the trenches are now treated by appreciative staffs to little kindnesses of a very practicable and palatable nature.

Naturally, when the men in khaki—to say nothing of the men in kilts—marched into the exchanges for the first time, some little flutter of excitement arose, but so inured are we to the sweeping away of cherished conventions—all because of war's necessities—that the presence of soldiers at the switchboards soon passed from the region of startling innovation to the common ground of daily routine. And the veterans of the battlefields have settled down to master the details of their new occupation with a quiet and willing composure.

Bar Committee for Private Service

The bar association's committee on the amendment of the law has announced its disapproval of a bill introduced at Albany, New York, by Senator Murphy, entitled "An act to amend the penal law in relation to overhearing telephone conversations." Concerning its opposition to the bill in its present form the committee says:

"Although the right of privacy receives greater protection from this bill in its present than in its original form and than from the other bills on the same subject which have been introduced in the present Legislature, the committee is still of the opinion that telephone conversations should be accorded the same degree of privilege as does correspondence intrusted to the United States mails, and that no one should be permitted secretly and clandestinely to intercept conversations over the telephone. The maintenance of the fundamental principles of civil liberty and constitutional right is of paramount importance. Even a search warrant is open and aboveboard; but the proposal to intercept private conversations is of a totally different character. To permit it to be done would give rise to serious abuses and to offensive inquisitorial practices."

The committee also opposes the bill of Senator Towner, entitled "An act to amend the penal law in relation to divulging contents of telegraphic or telephonic messages." Concerning this bill the committee says:

"This bill repeals the present provisions of law which make it the duty of any clerk, operator, messenger, or employe of a telegraph or telephone company to furnish public officers charged with the duty of prosecuting violations of law any information in their possession relating to unlawful business or traffic. This bill would cripple the present administration of the criminal law, particularly in the prosecution of violators of the gambling law, and is an unwise interference with powers at present possessed by prosecuting officers."

The principle of the statute sought to be repealed by this bill, the committee concludes, is entirely different from that of permitting prosecuting officers to intercept private telephone conversations.

Pennsylvania Rates Worked Out

The new schedule of rates announced by the Bell Telephone Company, bringing about a cut of approximately $460,000 a year to Philadelphia alone, gives no benefit to the small house-holder. Investigation shows that the cut was intended to give most of the advantage to business houses and patrons using anywhere from 700 to 4,500 calls a month.

At the office of the Bell Company it was learned that no reduction is to be made in the zone rates. These zones comprise West Philadelphia, sections in the northern part of the city, including Germantown, Chestnut Hill, Roxborough, Tacony, Holmesburg and a dozen other sections, where users pay a flat rate for unlimited service in their particular zone, with an additional charge of five cents a call for messages outside.

In some instances rates will be advanced. On that class of two-party lines where subscribers now pay $36 a year for fifty calls a month, the rate will abvance 4 per cent a message. The new schedule reduces the charge to $30, but the number of messages is reduced from fifty to forty. The present rate is six cents a call; the proposed rate, 6¼ cents. More than 12,000 users are affected by this increase.

The largest class in the city, those with four-party lines, numbering 22,000, get no reduction in the charge of $24 a year, but the number of messages allowed each month is increased from thirty to forty. In effect this is a saving of 25 per cent, putting the rate from six and two-thirds cents a call to five cents.

The bulk of the cut will benefit subscribers using from 1,200 calls a month upward. This class, composed mainly of business houses, will receive a reduction of from $12 to $15 a year, based upon the number of calls contracted for per month. The following table, affecting approximately 17,000 subscribers, shows the relative cut provided for this class:

Messages	*New rate*	*Old rate*
1200	$ 63	$ 75
1500	75	87
1800	87	99
2100	96	111
2400	105	120

Individual semipublic telephones with coin-collecting devices will pay a flat rate of $12, guaranteeing ten cents a day in the boxes. Forty-three hundred subscribers will be affected.

Service for the Camps

Three officials of the American Telephone & Telegraph Company, in Junction City, Kansas, completed arrangements with Manager Fegan of the local company for a system of trunk lines to run from the city to the mobilization camps on the reservation.

The Junction City company has lately increased the service to Fort Riley and the new lines are ready to be placed in operation.

The officials of the American Telephone & Telegraph Company went over the preliminary plans for extending the trunk lines and cables to the different camp sites, and it is expected that the improvements, which are to be started immediately, will cost over $30,000.

It is the intention of the company to give the patrons of the lines the best of service. Switchboards will be installed and expert operators will be in charge of the service.

The local telephone plant is one of the best equipped in the state. Only a few years ago the complete office equipment was replaced by the very latest and most modern equipment, and new trunk lines were built to different parts of the city, cables installed in conduits under the paving, and conduits laid in cement at every intersection so they could be used at any time.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

CONSIDERABLE trouble was experienced in European telephone exchanges with the use of the older types of prepayment stations reserved for long distance and suburban telephone traffic. As the amount of the toll charges had to be given to the caller by the operator and as the latter had to watch and see that the right change was given, it needed special operators, who would give all their time to these calls. Moreover some means had to be taken to inform the operator, when answering a call, that she was dealing with an automatic prepayment station. To this end the station call lamps at the A-switchboards were fitted with red lights and the calls were only answered by way of specially colored (red) wires; the plugs were likewise provided with a red rim. At the B-switchboard the lamps and cords are also red and the jacks at the C-switchboards are provided with red rims. This isolation of certain lines has some disadvantages. A number of lines must be reserved for this service and cannot be used for ordinary telephone service. As the traffic over these special stations is at times not very heavy, we have a percentage of idleness, which is disagreeable and expensive. Telephone engineers worked for a long time on a scheme to devise an automatic prepayment station set that would automatically cash in and register the proper tolls for the various calls. Consequently special operators for this kind of service could be eliminated and it would not be necessary to reserve special wires for this purpose. The mechanical action of such an apparatus must of course fit into the general scheme of the telephone system. The method of registration is very important. The registration must be entirely automatic. Then the toll rate is collected as soon as the number has been called and connection made.

The apparatus here described is found in a number of Dutch and German cities and seems to have given satisfaction. In the older apparatus, with automanual registration, using a push button, the registering device has really no important function to perform, as the toll charge is collected before connecting the call. In ordinary local traffic conditions are different. The charge is of course due as soon as calling current is sent out, regardless whether the call is answered or not. Registration and collecting of the charge in reality takes place only after the call has been answered and both sides have hung up their receivers. This process is laid down as the basis for the diagram sketched in Fig. 1 for the new apparatus. The apparatus cashes the coin only after the conversation is ended. This apparatus can be used for the present semi-automatic system of operation or for complete automatic system.

The cash slot opening is closed in the rest position and opens only after removing the receiver (not shown in the sketch). The telephone exchange can be reached only after a coin has been inserted in the slot. If no call is connected (busy wire, wrong connection), the coin is returned through the coin return slot. In other cases it falls down into the cash drawer. At the exchange these automatic station calls are treated just like every other call. The operator therefore does not know that she is talking to an automatic pay station. This would eliminate the present system of special marks for lamps, cords, plugs, etc. The exchange equipment would have to be increased by two relays *Ru* and *Ro* for each pay station wire, and the relay *TRa* would have to be equipped with two new sets of contacts. As soon as the *Ka* jack is plugged at the A-exchange switchboard, *TRa* operates and energizes the winding *I* of the polarised relay *Ru* by way of its second contact. The one leg of *Ru* (in the diagram on the right) is attracted and closes for a moment the slip contact $k\beta$ which is connected with the *b*-wire of the station circuit. This process has no effect, however, because the path of the battery by way of the attracted contact *2* of *TRa* is interrupted. If after the call is ended, the registering button is pressed down at the *C*-switchboard, or in the case of automatic stations the registering device is operated as the call current goes out, then the winding *II* of *Ru* is energized, as it is now in series with the holding coil of the relay *EZa*. The armature of *Ru* is turned entirely over to the other side (the left). The slip contact $k\alpha$ closes for a moment, without, however sending off call current at $k\alpha$, because the path to the *a*-branch of the station circuit is interrupted by the armature *3* of *TRa*, which is still attracted. But as soon as connection is broken at the A-switchboard, *EZa*, *Ru* and *TRa* become currentless. The armature of *Ru* returns to its rest position and call current passes over the slip contact $k\alpha$ and the released armature *3* of *TRa* into the *a*-branch of the station wire and operates the relay *Rk* at the automatic station, whereupon the coin falls into the cash box.

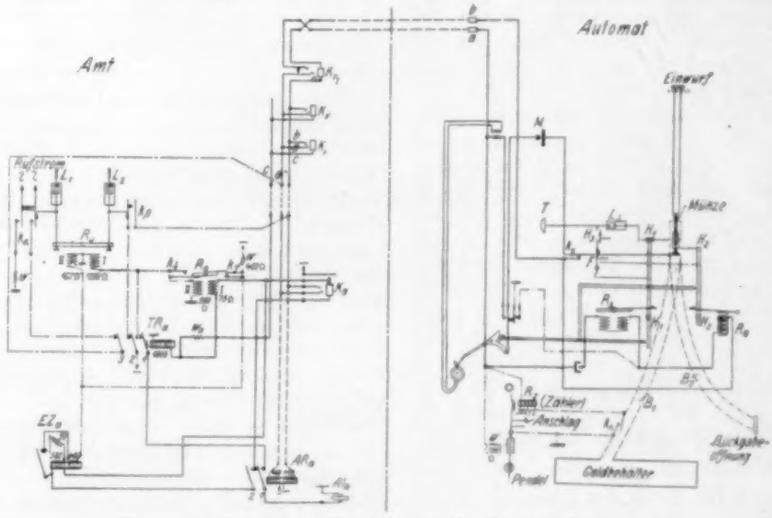


Fig. 1. Prepayment Station Diagram for Long Distance Calls.

If no conversation is carried on, the call registering device and the winding *II* of *Ru* are not operated either. As soon as the connection is broken at the *A*-exchange, the armature of *Ru* and contact *2* of *TRa* being released, the direct current finds

a path by way of the slip contact $k\beta$ into the *b*-branch of the station line and operates the relay *Ra* at the pay station. This process returns the coin to the caller by way of the return coin slot (B_2). Both armature legs of *Ru* are provided with air brakes L_1, L_2, so that the making of contacts is retarded. The relay *Ro* will operate, when the automatic station is called. In some cities, like Hamburg, this case occurs when the caller at Hamburg wants to talk to a suburban station. Such a call must be recorded by way of the B-operator and a suburban call distributing frame and is then sent on to a suburban exchange. The suburban operator makes a note of the desired number and also of the number of the calling station. This number also tells her that an automatic pay station calls. The user at the pay station hangs up his receiver after having given his number and waits until he is called. The call of the pay station, the desired number having been called, is carried out by a special operator called the *E*-operator in one of the city exchanges. When introducing the connecting plug into the multiple jack at the E-switchboard, current flows through the E-switchboard-relays *Re* and *SRe* (not shown on the sketch), then on over *Kv*, *c*-wire, *Wa*, *TRa* to earth and over a branch of *Wa* through the coil *I* of the polarized relay *Ro* over the *Ka*-jack, armature *1* of *ARa*, *ALa* to earth. The armature of *Ro* is laid over (to the right side) and closes the contacts $K\delta$, and $K\tau$ Contacts $K\delta$ energizes the coil *II* of *Ro*, whereby the armature is held long enough, until the connection is broken at the *E*-switchboard. Contact $K\tau$ sends current to the coil *II* of *Ru* and lays over the armature of *Ru*. As soon as the connection is broken, *TRa*, *Ro* and *Ru* are deenergized and current flows over the contact $k\alpha$, the armature *3* of *TRa* into the *a*-branch of the station line to the relay *Rk* in the automatic apparatus. The coin is collected. The coil *II* of *Ro* must act as a holding coil, because the path from *Wa* to *ALa* is currentless, if call current is sent out. It is not advisable to place *Ro* into the section reaching from *Kv* to *Wa*, as then the relays *Re* and *SRe* at the *E*-switchboard would not operate with a sufficient degree of certainty. *Ro* of course is energized, when *Ka* is plugged, but cannot operate, due to its polarity. According to these various processes, just described, provided the call is connected, call current or else direct current is sent into the circuit of the automatic station.

The pay station apparatus is to be equipped with the relays *Rk* and *Ra*, which must have the same impedance for call currents. *Rk*, which also serves as calling and ringing relay, has to collect the coin, while *Ra* returns it. The two levers H_1 and H_2 are designed as slots and their mutual arms which come together like the two sides of a roof, close the path taken by the coin at the bottom and hold on to the coin. If *Rk* is operated by call current, H_1 falls away (in the sketch toward the right) and the coin slips into the coin guide path B_1. If *Ra* is energized by direct current, then H_2 falls away (to the left) and the coin is released and returned by way of the return coin path B_2. When the coin is thrown into the slot, it strikes on the upper spring of contact ϵ and thus closes the battery current circuit. The spring *F* is used to safeguard the contact ϵ. This spring releases the contact ϵ, as soon as one of the levers H_1 and H_2 is removed from the rest position. The rest position of levers H_1 and H_2 is resumed, when the receivers are removed from the hooks, which latter return the levers to their original position. In suburban calls, the coin, which was first inserted in order to call the exchange operator is returned to the caller. When finally calling the suburban station, that is, when the return call is made to the pay station from the desired suburban subscriber's station, a new coin must be inserted. In order to collect the coin, the user presses down a button *T* after removing the receiver. This button pushes the horizontally movable lever arm of lever H_1 aside (in the sketch to the right) and the coin glides into the coin slide path. The suburban exchange operator must now receive an audible signal, telling her that the coin has been deposited. This is easily done by using a pendulum, which closes and then opens the battery current for a few seconds. The pendulum can be operated mechanically by the button *T*. It is still better to use a relay, which is energized by way of contact $k\delta$, while the coin glides into the cash box.

This relay *Rz* serves also as call counter. The return movement of button *T* ought to be retarded by air brake L_3. The air brake should also be connected with the locking devices which locks the coin slot opening. The air brake L_3 should also open the contact ϵ by means of lever H_3.

As it is out of the question that the automatic pay station just described is economically advisable for all cities, and is particularly out of place in small communities, it is proper to call attention to one drawback of the present pay station apparatus. It might be advisable to remove the gong spring which announces the depositing of the coin and substitute for it the pendulum previously mentioned. This is set into oscillations for a few seconds as soon as the coin receiver lever has deposited the coin in the cash box. The pendulum would close the battery current and then open it in rapid succession and would cause a noise similar to that made when winding a clock, which is not as easily imitated as is the ringing of the gong in the ordinary machines. Perhaps it is even possible to attach a mechanical registering device which offers a suitable control over the amount collected during the week and assures the telephone company that the money deposited by the public agrees with that collected and returned to the office by the collectors. Pendulum and registering device would have to be operated by an arm fastened at the lower shaft of the cash collecting equipment. In order to prevent that pendulum and register operating, without a coin having been deposited, the ridges cut into the shafts of the coin registering device would have to be provided at proper places with proper slots, which will prevent the coin being returned to the user of the pay station.—*Fernsp. Technik.*

PROTECTION OF OIL INSULATED SWITCHES AGAINST EXPLOSIONS.

Oil insulated switches are so commonly used in all kinds of electrical work, that an article on prevention of fires and explosions on these switches, caused by short circuits, may be of interest. Various proposals have been made to this end, among them one which advocates the filling of the space above the oil with a neutral gas, perhaps nitrogen. This was said to prevent explosions at the switches, as the generating oil vapors would then have no occasion to mix within the switch with air and after ignition to explode. In other cases it is advised to leave out every air cushion and to connect the switch by means of stand pipes of 4 to 6 inches in diameter with an oil tank which was placed from 3 to 6 feet above the switch. This was said to prevent an explosion.

In dealing with a short circuit, we have to look out for two causes for explosions: (1) the amount of heat liberated in the electric arc during the discharge, (2) the quantity of heat which results, when oil vapors, which

resulted through (1) are mixed within the switch with air and then are ignited and burn. A switch casing and the switch can be destroyed only, if the quantities of heat mentioned under (1) and (2) are large enough in order to cause a greater degree of pressure or occupy a greater volume of space than is possible under the given conditions.

This shows clearly, that an explosion of the switch cover need not be necessarily due to a combustion of oil vapors, but that the electric heat evolved may impart to the vaporized oil such an increase in pressure, that the walls of the switch casing give way and oil and oil vapors escape into the open air. The quantity of heat named in (1) may vary in magnitude, depending on the mechanical and electrical conditions which prevailed in the switch at the time of the short circuit. The heat named in (2) will reach its maximum limit, when the air space above the oil is intimately mixed with so much oil or oil vapors as is theoretically necessary for complete combustion without an excess of air. We may assume for practical purposes that a considerable portion of the heat generated by the short circuiting electric arc evaporates a certain quantity of oil and therefore causes an increase in pressure which is sufficient to destroy the switch with its casing. The conclusion lies near that in many cases the use of neutral gases, such as nitrogen will not only not prevent the casing from bursting, but will not even be able to prevent a fire, as the oil vapors, when issuing from the switch cover will find sufficient air to mix with in order to cause a flame and fire. It is very likely that the process is as follows: a small portion of the oil vapors burns in the interior of the cover before the latter bursts, but the greater portion of the oil vapors issues into the open air on the bursting of the cover, ignites there, and liberates sufficient quantities of heat that can start the real fire. Of course the two steps occur in such rapid sequence that both seem but one. It seems therefore out of the question to look for sufficient protection with the use of neutral gases, as has also been proved by experiments. The second proposal to connect the switch with a separate oil tank by pipes also offers some objections, primarily because the pipes leading to the oil tank would not be wide enough to allow enough leeway for the expansion of the pressure by the oil in case of a short circuit. The pipes to be safe would have to be very wide, very short in length and free from sharp bends.

The fundamental result of experiments is, that the quantity of heat liberated during a short circuit is not so dangerous through its magnitude, as through the fact, that it passes over generally into gases with a smaller calorific factor or else vaporizes oils and thus causes a tremendous increase in volume. If it were possible to transmit the quantity of heat generated by the electric arc uniformly into the entire volume of oil used for insulation, then the danger for the switches would be eliminated. This is, however, impossible from the practical viewpoint.

We will therefore have to devote our attention not so much to the prevention of the explosion or the fire but rather to the extinguishing of the same. Among other agents carbon dioxide was used as a fire extinguishing agent. To use carbon dioxide for this purpose in fighting fire on electrical apparatus that carries current has various advantages. Its more general introduction into electrical service has been prevented by the fact that it was difficult to empty the CO_2 tanks quickly, as the gas froze when pouring out of the tanks and clogged the outlet valve. There are of course devices that preheat the carbon dioxide with steam and try to prevent the formation of snow, but they have not been perfected enough to be readily and quickly applicable. A method was found however during the experiments, which permitted the emptying of a tank within 35 to 45 seconds as against the maximum of 11 minutes when using the commercial appliances. The test room in which oil switch fires were put out had quantities of as high as 220 to 440 lb. of oil burning and to put out this fire there were only needed 22 lb. of carbon dioxide. In every case the fire was "smothered" rather than "extinguished." While water chokes the fire in that it keeps the oxygen of the air away from the fire, it has a second important effect due to its great specific heat, in that it cools off the parts heated by the fire to a point below their ignition temperature. Carbon dioxide cannot do this owing to its low specific heat. It smothers the flames, but cannot in general cool the burning bodies sufficiently to prevent a new fire from breaking out, if fresh air comes in contact with the burning parts. Moreover we must remember that the ignition point of oils is fairly low. If, for example, parts of the switch have been heated to a high temperature during the fire, and if the fire has been smothered by the CO_2 it is quite possible that the oil vapors coming in contact with the heated parts are again ignited if fresh air should reach the heated interior parts of the switch. For that reason a switch fire must be treated, by first having one or two carbon dioxide tanks empty into the switch case, which will smother the fire in about 1 or 2 minutes. Then after 8 minutes another tank of carbon dioxide is emptied into the switch cover, thus assuring the temperature drop of the interior portions necessary for safety. Then after 10 or 12 minutes the switch case can be opened and exposed to the air without fearing the outbreak of a new fire. (Unfortunately the author did not describe the simplified device which they used to empty the carbon dioxide so as to avoid freezing; doubtless the device is to be worked out into a patent, which would account for leaving out the description in the article.)—*Elek. Zeit.*

CABLE JUNCTION BOXES IN THE PARIS TELEPHONE SYSTEM.

Troubles which affect the telephone wires in the underground cable system of Paris may be roughly divided into two classes: (1) Troubles whose seat lies in the cables themselves, in the wires, in the intermediate distributing frames at the exchanges, or in the houses of the subscribers. (2) Those faults which are localized in the cable junction boxes installed in the cable manholes and basements of exchanges where all cables meet.

The former faults were caused in almost all cases by a change in the lead covering of the cables. The measures taken by the Paris telephone bureau to remedy these faults have resulted in a great improvement of service. Among these might be mentioned automatic fault finding devices which announced to the repair department where a leak was caused in the cables. The cable junction boxes were the most important sources of trouble and frequent attempts had been made to eliminate trouble in these. Paris is composed of a number of isles situated in the Seine river and this fact, as also the fact that the manholes in which the cable boxes are placed communicate with the sewers of Paris, made it necessary to install cable boxes of special strength and quality. The cables must be protected not only against the ordinary humidity of such surroundings but also against inundation, a matter which came forcibly into notice during the Paris floods some years ago.

When these boxes were received at the testing department of the telephone bureau they were subjected to

rigorous tests. They were plunged into water and had to stand an internal pressure of 3 atmospheres without leaking. The necessity of this treatment was seen some years ago, when the Seine flowed over the banks at several points in the spring and soaked these new cable boxes completely. In spite of this severe wetting the cables remained dry, although the water covered the boxes in their manholes during 48 hours. To make an even more severe test, a box filled with paper insulated cables was plunged into a reservoir 30 feet deep, filled with water and left in this for two weeks, without the insulation of the cables being injured. The older type cable boxes have gradually been replaced, so that at present there are about 235 of the old type and 600 of the new type in use all over Paris. The faults in cables located in the boxes are relatively as follows: 27 per cent of all

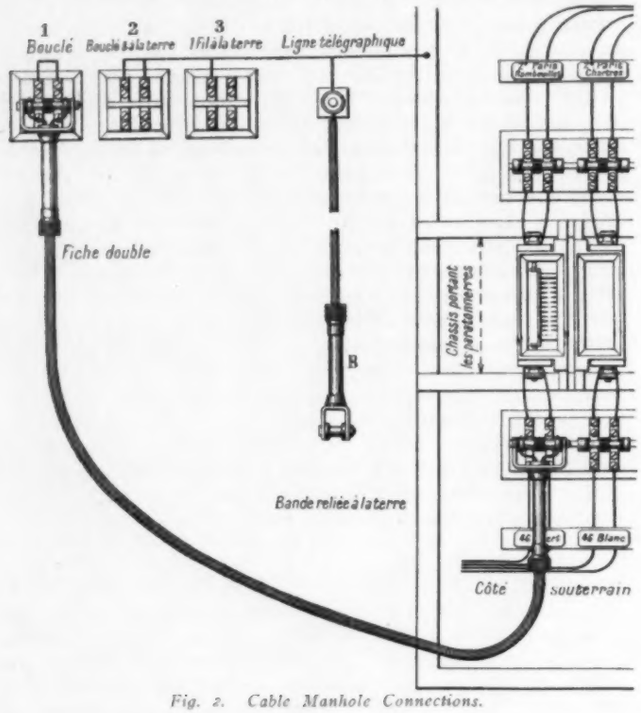


Fig. 2. Cable Manhole Connections.

faults were located in the old boxes as against only 1.03 per cent in the new models. None of the latter was due to leaks of the boxes either.

As the Paris department has charge of both telegraph and telephone lines, it is natural that both receive a great deal of attention by the same engineers. In Paris, as in all large cities, the overhead telegraph and telephone lines end in manholes, from where they are connected to the wires in the exchanges by means of cable manholes. In the manholes themselves the cables end either in connecting terminals provided with the usual safety equipment or in terminals provided with lock nuts. These terminals to which the cables are attached are usually found on a copper bar, which must be removed to insulate the lines. The different tests with the various lines are either made by grounding them or in using the loop test with the various circuits. While all these tests are easily made, it happens sometimes that the terminals are detached, or loosened, contact becomes imperfect and the results of the measurements are faulty.

This proposal was made to simplify the use of fixtures in these cable manholes in several ways: 1. The zinc staples used to hold the cables in their places when passing through the walls of the manholes were eliminated. The cables are simply to be passed through the vitrified clay conduit openings of varying diameter in such a way as to permit at any time the removal or change of any one of the cables. 2. The use of spring fuses, giving a simpler and better way of disconnecting and again connecting circuits. After the conductors have passed the safety devices, they reach a set of spring segments. When the circuit is closed, these spring segments are united by a small copper cylinder. In case of telephone wires, the two wires are grouped and a single cylinder per circuit is used. The latter is divided into three parts, the middle portion being of ebonite. Figure 2 gives the appearance of this new scheme.

In order to obtain insulation of conductors it is only necessary to withdraw the cylindrical plug; in order to ground the wires or to make the loop test, the cylindrical plug is replaced by a simple or double testing plug, depending whether the line is telegraph or telephone. In the figure, *boucle-loop; fil à la terre* = grounded wire; *ligne telegraphique* = telegraph wire; *fiche double* = double plug; *bande reliée à lt terre* = grounded strip; *chassis portant les paratonnères* = case containing the lightning conductors; *côté souterrain* = underground side.—*Annales des Telephones.*

AN ACCIDENT AT THE TELEPHONE.

A case was some time ago decided by the courts, which is amusing on account of the numerous reasons cited by the court in upholding its decision, as also showing another instance where some one tried to "get" the company for damages, which were uncalled for and for a probably fancied injury. A certain businessman F.... used the telephone in a hotel. During the conversation the connection was cut off and F.... claimed that he received permanent injury through the noise connected with this interruption of service. He sued the administration of the telephone department. His suit was denied in all courts, also by the Imperial courts. The following reasons cited by the courts might be emphasized: The telephone department had made no contract with the plaintive, but only with the subscriber, in this case the hotel proprietor. Consequently there could be no question of liability of the department. Even though the plaintive used the telephone with the permission of the subscriber, this does not mean that the department enters into business or contract relations with the plaintive. Nor was any punishable or careless action of the department in question, as it had not been proved either that the telephone was actually out of order or faulty. The plaintive and not the defendant would have to prove that the department was guilty of a punishable offence. Moreover, the department could not be held liable in its status as legal person on the basis of civil law, but only on the basis of the laws which related to the department itself. But these were not applicable, as the case had nothing to do with the exercise of "enforcement of public laws," but only as the office of the department as a public carrier. In addition it could not be assumed that every official and operator was a representative in the legal sense of the word. The operator does not act independently for the state, in carrying out certain mechanical operations to make a connection.

DISRUPTIVE STRENGTH OF PAPER.

The disruptive strength of nonimpregnated paper was examined in detail in one of the University testing

laboratories. With 1,000 disruptive tests, using 24 different kinds of paper the disruptive effect came always at the same tension, and after the same space of time. As the disruptive strength depends a great deal on the humidity, the paper has to be kept for two days in a box having a certain degree of moisture, before being tested. The dependance of the disruptive strength on the moisture is shown by the following figures: With 10 per cent moisture, 5,700 volts; with 40 per cent, 4,500 volts; with 60 per cent, 2,500 volts. The disruptive strength does not increase proportionately with the thickness of the paper, for due to the drying out of the paper through heat losses, the disruptive strength increases during the test. This increase is more rapid with thin than with thick paper. In the tests the voltage must be advanced by leaps of say 200 volts and must be exerted long enough, so that the paper may reach a corresponding state of balance. The disruptive tests were made between ball and plate as electrodes. With increasing ball diameter the disruptive voltage drops; from 6.4 inches diameter on, it is independent of the diameter. With increasing moisture of the paper, the influence of the ball diameter becomes less. The disruptive strength is naturally also dependent on the thickness of the layers, but no conclusion could be drawn as to the relations from the tests.

THE TELEPHONE PLANT.

The island of Porto Rico is troubled by a plant, which might well be called the telephone plant and which is found like so many birds' nests sticking to telephone poles. These plants are of the creeper type and grow in enormous tufts, which if not destroyed climb from wire to wire, cause short circuits and have often put a telephone line out of business for some time. The plant belongs to the family of the orchids, has no roots and takes its food primarily out of the air. It twines a knoblike confusion of stems around the wire, from which some twenty small flowers grow. The birds eat the seed in the flowers and transfer them when they settle on some other wires. This plant has only been found on rusty iron telephone wires and is absent from the newer copper wires or the fresh, smooth iron wires, as they can not get a hold on these. This matter has led to a sort of competition between the state and the private telephone companies in Porto Rico. The state-owned lines were the older ones, whose rusty iron wires were a prey of these plants, while the private company had installed up-to-date copper wires. However, where the line passes through communities where the older state lines were, these lines have to be used, as long as even a faint scrap of conversation can be understood. Only when the telephone plant has made all conversation impossible may the private company start operation. Thus this plant, which formerly was considered a curse, has turned out to be a blessing, in that it hastens the transition from out-of-date state-owned antiquated telephone lines of iron to the modern, efficient copper telephone lines of the private telephone company.

Telephone Jobs for Iowans

A new proposition is being put up to Iowa high school seniors who will graduate this spring. It means that they will go to work for the Iowa Telephone Company at $50 per month, where they will put in five months, whereupon they go to Ames, where they study seven months, then coming back for five or six months, after which they again take up their work at Ames. Having completed this, a permanent position will be open to them in the telephone service, and what further progress they may make rests entirely with them. As the number to be admitted to the course at Ames this year will be limited, the first comers will probably stand the better chance. The college at Ames describes this course as follows:

This is a special part-time course given in co-operation with telephone companies for young men who are (or expect to be) engaged in telephone work. It is open to any young man in the state, but only those retained by a telephone company are certain of employment when the school work is completed. The course probably will require two years of time alternating school instruction and practical work. Five months each year (May to September, inclusive) are to be devoted to practical work with pay in the employ of a telephone company, and seven months (October to April, inclusive) are to be devoted to school instruction at Ames. If necessary, a man may return to field work at the close of the first semester, about February 1, and return the following year to take up his work at the beginning of the second semester. Men taking this course, who are detailed by a telephone company, are considered to be in the employ of the telephone company throughout the year, but receives wages only while at work in the field. Regular reports of scholarship and progress will be made to the company concerned.

The schedule of studies follows:

FIRST SEMESTER

Business English.
Telephony.
Telephone practice.
Mathematics.
Shop drawing.
Wood shop work.
Elementary electricity and magnetism.
Physical training.

SECOND SEMESTER

Business English.
Telephony.
Telephone practice.
Mathematics.
Shop drawing.
Forge work.
Elementary physics.
Physical training.

How Operators Can Help

"Telephone operators can render valuable service to the government in time of war by making rapid and thorough connections in their work, particularly when messages pertain to military affairs," said Sergeant Frank Burnside, U. S. A., to some twenty-five switchboard operators in Omaha, Neb.

Sergeant Burnside gave the girls an idea of daily army life, the treatment of the men and the genreal things that go to make up the experiences of a soldier. He related a number of personal experiences and complimented the Japanese, both men and women, as being the most patriotic people with whom he ever came in contact.

The meeting was arranged by Mrs. T. R. Rutledge, who is head of the telephone operators' contingent of the general division of the Omaha Chapter of the National League for Women's Service. It was the first of the contingent meetings arranged for practical instruction of women in different lines of work.

Pioneering on the Pacific Coast

From a Paper Delivered Before the Telephone and Telegraph Society at San Francisco

BY J. W. GILKYSON

THE romantic history of San Francisco from the "days of '49" to the present is more or less familiar to all. The evolution of the pioneer village to its present proud status of a "world metropolis" is due in large part to the indomitable courage of the early settlers, which made possible the building of a cosmopolitan commonwealth, distinctive for its individuality and initiative. San Francisco stands today as the living embodiment of the "Spirit of the West," undaunted and even strengthened by adversities, triumphant over disaster, and yet unsoftened by its prosperity and natural advantages. So also from its inception may we describe the development of the telephone industry.

We can point, with pardonable pride, to the fact that telephone men have always met—yes, anticipated—the requirements of this growing metropolis from the days when the most important use of wire communication was the dissemination of the news of the arrival of clipper ships to the present era of "universal service."

In the days gone by, the telephone business was carried on by a very small group of men, who were as intimately acquainted as a small family; today a huge organization of men and women is required to meet the telephonic requirements of the public.

Accustomed as we are to dealing with the problems of the present, as well as those of the future, it is helpful at times to turn to the past for inspiration.

I therefore offer some reminiscences, mostly at random, of the days and events of our pioneer telephone family, with the sincere thought and hope of furnishing tangible and precious traditions as a motive to the younger men of today who are destined to carry the accomplishments of the past forward to the triumphs of the future.

Coincident with the inauguration of the first Merchants' Exchange in San Francisco in 1849, Sweeney & Baugh, the founders, responded to the need for a means of communication to serve in imparting the shipping news of the day as quickly as possible after the sighting of incoming vessels.

A semaphore system of three stations was installed and lookout men placed in charge. One was located at Point Lobos, a second on a hill opposite the old Presidio House, and the third on Telegraph Hill, which was so called because of the fact that it was from this point that the news was really telegraphed to headquarters, and incidentally to the greater part of the city.

The Point Lobos men would signal, by means of flags, the character of an incoming vessel, and a further description of its class, name, etc., would be sent in code. In turn Presidio and Telegraph Hill would receive and repeat the messages.

Whenever the American flag, which was the signal for the arrival of a mail steamer, was seen on Telegraph Hill, the excitement and commotion were intense. Crowds would immediately rush to Lowe's Wharf, to the postoffice, or gather at the prominent street corners and await the arrival of the newsboys, from whom they would purchase a New Orleans *True Delta* or a New York *Herald*, five or six weeks old, at $1 per copy, to learn the news of the world.

This semaphore system served until 1853, when Sweeney & Baugh built a telegraph line from the Merchants' Exchange on Sacramento street, via Telegraph Hill to Point Lobos, a total distance of about eight miles. This, considered at the time a stupendous undertaking, was the first telegraph line in the state.

Further improvements of local wire communication did not appear until 1876, when, after the telephone was invented, a line was constructed from the Merchants' Exchange to Meiggs Wharf for experimental purposes.

In the spring of 1877 the first telephone installed for practical purposes was furnished to Fred Marriott, editor and proprietor of the *News Letter*, on a private line from his office on Merchant street to his residence on Jones street. In the summer of the same year, the first switchboard in San Francisco was installed in the office of the Gold and Stock Telegraph Company at 222 Sansome street, with eighteen stations connected. This company became known as the American Speaking Telephone Company and was an offspring of the Western Union Telegraph Company. Its first telephone directory was printed in 1878 and contained 178 names.

In 1876 Theodore N. Vail, Gardner Hubbard, Thomas Watson, Mr. Bell, and Mr. Blake organized the first Bell company, which was, however, merely an association of which Mr. Vail was the president. This association later became the National Bell Telephone Company of Boston, and in the year 1878 consolidated with the New England company and formed the American Bell Telephone Company.

In the same year the National Bell Telephone Company of San Francisco, the original sub-licensee of the territory comprising California, Oregon, Washington, Nevada, and Idaho, under patent rights to the Bell instrument, started in business at 140 Montgomery street with Samuel Hubbard as Pacific Coast agent.

The American Speaking Telephone Company at this time was using the Edison telephone. The Edison instrument was claimed by the Bell Company to be an infringement, and this was made the basis of a suit over patent rights on telephone instruments, which was one of the longest and hardest fought suits of record in the courts of the United States, being settled only in 1913.

In the year 1880 the Gold and Stock Telegraph Company, known as the "American Speaking Telephone Company," and the National Bell Telephone Company of San Francisco effected a compromise and consolidated under the name of the "Pacific Bell Telephone Company," operating in San Francisco only, with offices at 222 Sansome street. Its executives were: George S. Ladd, president; John I. Sabin, general superintendent, and George Sawyer, superintendent of construction.

During the interval between 1877 and 1883, telephone development was not entirely confined to San Francisco, as nearly all of the important towns showed

some activity and local exchanges were being installed. These were usually financed by some relative or close friend of the officers of the company, and were operated under sub-license agreements with the Pacific Bell Telephone Company, being privately owned.

In 1883 the Sunset Telephone-Telegraph Company was incorporated to operate in all the Pacific Coast territory, excepting in the City of San Francisco. This company absorbed all of the smaller companies which had sprung up and immediately began the construction of toll lines, thus laying the foundation for the present day toll system. The funds for the building of the toll system were secured through subscriptions, and scrip, similar to that used by the government in promoting railroads, was issued, which entitled the purchaser to apply his investment to toll usage.

In 1889 the company was reincorporated as the Sunset Telephone and Telegraph Company, and in 1890 Pacific Telephone and Telegraph Company was incorporated, taking over the Pacific Bell Telephone Company.

In the same year the Oregon Telephone Company, W. B. King, president, and J. H. Thatcher, secretary and treasurer, operating in Western Oregon and Washington, and the Inland Company, Mr. Norman, president, and C. B. Hopkins, secretary and treasurer, operating in the eastern parts of these states, were incorporated.

In 1900 the Pacific States Telephone and Telegraph Company was incorporated, taking over the Oregon, Inland, and Pacific Telephone and Telegraph companies.

In 1907 The Pacific Telephone and Telegraph Company was incorporated, taking over the Pacific States Telephone Company and leasing all properties of the Sunset company not already taken over as a part of any of the other companies entering into the consolidation.

Upon the Pacific Bell Telephone Company fell the arduous task of developing the telephone industry in the city of San Francisco. It was realized by this time that the telephone was to become the greatest factor in the commercial welfare of this community, yet there were no experts or technically educated men to handle the many problems which were being continually encountered, and it was therefore necessary to draw the talent from among men who were seemingly adapted to carry on this work. For the most part, the construction problem was easily solved, inasmuch as the stringing of wire for telephone purposes was identical with that of telegraph wires, and linemen were taken from the telegraph company. However, the matter of switchboard and instrument installations presented another problem, which required help that could not be so easily procured.

Among these pioneers we find the names of Simon Mann, John Hogan, William Delahanty, Piercy Lacy, Tom Clayton, Barney Cassidy, John Lawrence, William Sullivan, Frank Lewis, and John Kearns, our present superintendent of collections.

The first switchboard placed in service was a very crude affair, consisting of a row of brass clips with a hole in the center, upon which were terminated the subscribers' lines. The only method of getting the office operator of this switchboard was to turn in the telephone call on the American District Telegraph call box. This was indicated on a tape and the operator of the American District made a ticket which he passed, indicating the number of the telephone to be answered, and the subscriber was then answered by the operator, and the call completed. He inserted a magneto set on the end of the line and rang the subscriber, and removed his set to connect the two together by means of two plugs connected with a piece of copper-covered wire.

The call box system of getting central was soon superseded by an annunciator system. This system was installed at 222 Sansome street. The lines in this case terminated on the annunciator box, and central was secured by pressing a button on the instrument. Edison instruments were used in connection with this switchboard.

The original switchboard of the National Bell Telephone Company installed at 140 Montgomery street was of a cordless type, being constructed of brass bars and cross bars about three-quarters of an inch wide, one set running horizontally and the other vertically. These bars were insulated one from the other. At the intersection of each bar there was a hole drilled in which could be inserted a brass plug. The office was signaled by magnetos at each sub-station, and to make connection between two subscribers two brass plugs were inserted tying the appropriate bars together.

A set of extension bells were arranged on the wall above the switchboard. As the sounds from these bells were similar, considerable confusion was encountered in tracing the calling line. It was through the genius of Joe Leonard, then switchboard man and operator, and who is still with the company, a scheme was devised, whereby the operator could accurately determine which line was being rung. Joe attached to the tapper of each bell a piece of string about eighteen inches long, to which was tied a cork, and whenever the bell rang they could identify the subscriber by the bobbing of the cork.

Upon the consolidation of the two companies this old switchboard was moved and placed in service at 222 Sansome street. Both of the switchboards were later replaced by an improved type of the jack and drop style which, in fact, is the original basis for the present style of magneto board in use at our small exchanges.

There was a charge of 5 cents for putting up a connection, but the contract specifically stated that there would be no charge for disconnection.

About this time the magneto bell came into use for signaling, and my recollection is that there were two types—the Post magneto and the Gilliland magneto. The Post bell was a wooden box affair with a crank on the side, whereas the Gilliland was a cast iron box with the crank on the front.

The Blake transmitter also came into use at about the same time, necessitating a change in the original switchboard. The jacks, however. were not changed, and magneto drops were substituted for the annunciator and extension bells.

About the year 1886 the need for more and better facilities was so great that the situation became critical. Quarters were then secured at 323 Pine street, and a new multiple single line type of switchboard was installed. This was a five-panel, two-position board equipped for 3,500 subscribers, manufactured by the Western Electric Company of Chicago and installed by William Hofmeister of that company. His assistants

were William Hampton, Joe Leonard, and Charles Smalling.

This board handled the business of the main office district until it was superseded by the express system. This switchboard had a very sad ending. We have heard of switchboards being put out of commission by electric wire crosses, fires, etc., but this board died a most peculiar death. About the time it had fulfilled its requirements and was to be removed, the company gave employment to Dan Lehigh, an old-time Western Union operator and personal friend of Mr. Sabin. Mr. Lehigh was assigned the welfare work at the Main office, and he had only been there a few days when he discovered the place was infested with the California flea. After unsuccessful effort to rid the operating room of the pest, Mr. Lehigh conceived the idea that the only place they could propagate was in the spring jack, and proceeded immediately to treat each spring jack with an injection of buhach powder. This not only killed the fleas but also the switchboard. The city was at this time divided into districts, as follows: Main office, known as "D" office district, was assigned the 1000 numbers; No. 2 office, on Sutter, near Leavenworth, was assigned the 2000 numbers; No. 3 office, 961 Mission, was assigned the 3000 numbers; No. 4 office, on California west of Fillmore, was assigned the 4000 numbers; Mission office, Twentieth, near Mission, was assigned the 6000 numbers, and Butchertown office was assigned the 7000 numbers. The 5000 numbers were reserved for the development of the "D" office.

In each instance these offices were associated with the Western Union Telegraph office. The equipments consisted of the magneto type of switchboard with Warner drops and what was known as the "Liverpool spring jacks," a brass casting of three contacts which was inserted into a wooden panel.

Simultaneously with the installation of the switchboard at "D" office, boards were also installed at the new No. 2 office, corner of Hyde and Sutter, and the new No. 4 office, Pine and Steiner, and the new South office, at 948 Mission street, these boards being single line magneto type, similar to the ones that were installed at "D" office.

The subscribers' set used was of the Post Bell type and Blake transmitter mounted on what was known as the "Sabin base," a pine baseboard to which was screwed the magneto bell and transmitter, and provided a box for the installation of a Le Clanche battery.

Right here we began to encounter real difficulties.

It was necessary to change from the Edison to the Blake type of instrument, and many subscribers, knowing of the controversy as to the superiority of the Edison over the Blake instrument, refused to allow the change. It was found necessary, where the Edison instrument could not be removed, to re-arrange the signaling device by installing a magneto bell. The change to the new type of transmitter had just about been completed when, in 1892 or 1893, the Hunning carbon dust transmitter was placed on the market. This instrument was heralded as being superior to both the Edison and Blake type, and, where installed, carried an extra charge. Such telephones of the Hunning type were known as "long distance telephones"—being indicated in the directory by a star appearing before the subscriber's name. Shortly afterward an improved transmitter, known as the "Berliner solid back transmitter," replaced the Hunning instrument. The Berliner type is practically that in use today.

The Pacific Company was one of the first companies to use the dry battery, in 1890 substituting it for the Le Clanche batteries on all installations, two and three cells being installed with the Blake instrument, and four with the Hunning.

Practically speaking, the work which had been done up to this time was of an experimental nature, and a full realization of the magnitude of the proposition had not become generally recognized. However, a gradual change was nevertheless apparent, and it was at this time that the foundation was laid for the present-day methods of preparing for anticipated development.

The nature of the personnel of the employees seemed to respond and awaken to these facts, and the telephone family, now considerably enlarged, was augmented by men prepared by specialized experience in other fields.

Horace Greeley's admonition, "Young man, go West," was heard by our Eastern brothers, and among those answering the call were Mr. Jackson, a telephone engineer of renown; D. P. Fullerton, Otto Melkie, A. J. Steis, E. J. Zimmer, Frank Allston, Howard Hensley, and William Parrott.

To these men is due great credit for assisting their Western brothers in stemming the tide of prosperity which seemed about to overwhelm them. The increased demand for service brought to the executives a realization that to meet conditions it would require large expenditures in order to accomplish the desired results to insure success. Definite plans were formulated and the necessary arrangements made to insure the future financial stability of the telephone industry.

It seems at this critical moment that every mechanical genius had turned his attention and talent to the telephone problem. Chief among the difficulties to be overcome was the factor of obsolescence. Already vast amounts of money had been expended in experimenting toward the development of a more practical and flexible system to replace the crude and inadequate equipment then in use.

It was during this period that William Hampton, with the assistance of John I. Sabin, developed and patented the express type of switchboard which was about to become the standard switchboard of the Pacific Coast territory. This switchboard was made up on the principle of local battery talking and common battery signaling, eliminating the former magneto ringing, and providing automatic clearing out of signals.

Another feature, which up to this time had seriously threatened the life of the telephone industry, was the development of electric lighting. A series of arc lamps had been installed for city lighting, and, whenever the power was turned on, the inductive interference on our grounded telephone lines was so pronounced as to render them practically useless.

The first step in overcoming this interference was to metallize the grounded lines. Common battery signaling, the fundamental basis of the express system, required just this remedy, and it was exceedingly fortunate that events so followed as to present this solution at so critical a time.

The company purchased the building occupied by the Mercantile Library, located at 216 Bush street, which was directly in the rear of the "D" office at 323

Pine street, and in 1892 steel bridges were constructed between the fourth and fifth floors of the two buildings and preparations were made for the installation of the express type of switchboards, under the supervision of D. P. Fullerton.

Many of the young men then working with the company and who are now holding responsible positions, owe to Mr. Fullerton a debt of gratitude for the knowledge gained of the telephone business, as he taught it at the time. Although many of us had been employed in the business for some years, few had ever had the opportunity of following the construction of a switchboard from the building of the frames to its completion. Mr. Fullerton assembled his helpers in these installations from the available talent then employed by the company. Among these mem were: James Dumphy, Con Tiegeler, Sam and George Stevenson, George Van Buren, Howard Hensley, John Cronin, Fred Springer, Fred Smalling, Charles Smalling, Charles Wall, Otto Melkie, Charles Wallin, J. H. Corcoran, Joe Leonard, Frank Allston, William Parrott, and John Gilkyson.

Upon the completion of installations in the various sub-offices in San Francisco, each of these helpers was placed in a responsible position either as switchboard man, foreman of installations, manager, or equipment foreman.

This type of equipment was in use until 1905, at which time it was replaced by the present type of multiple common battery switchboard.

Having given a rough outline as to the development of the switchboards and instruments, I will now give you an idea of the difficulties which were encountered in developing outside construction, as it occurred, coincident with the changes from one type of operation to the next.

Until 1880 practically all outside construction in San Francisco was on housetops. Nearly every roof of the downtown buildings had large structures erected, carrying telephone and telegraph and district messenger wires.

The first pole line construction started in front of the office at 222 Sansome street was destined to reach Market street. The work had progressed satisfactorily as far as the corner pole at Bush and Sansome, in front of the Murphy-Grant Company. A Swede by the name of Sorenson was delegated to dig a hole at this point. The beginning of this job brought a protest from the head of the firm, but Sorenson had his orders to dig, and proceeded accordingly. When down about eighteen inches the iron bar disappeared through the hole and feil into the basement, disturbing the peace and quiet of the Murphy-Grant shipping department, as well as wrecking about twenty feet of shelving. This did not interefere with the setting of the pole. A three-legged jenny was erected and the pole swung into place. However, as soon as the butt appeared in the basement the shipping department got busy and, taking hold of that end of the pole, shook it and wrecked the jenny. This was immediately replaced, and the pole again swung into the hole. This time it was dropped with a thud that brought it to the floor of the basement. The shipping department was still on the job, but each one had an ax, and the pole began to disappear about six feet at a time, until the top followed the butt into the hole. Incidental to its disappearance, the Murphy-Grant shipping department appeared on the scene, axes in hand, and the fun began.

About this time Superintendent Sabin appeared on the scene. The story is told that as soon as axes, crowbars and shovels began to fly, so did Superintendent Sabin. An eyewitness told me that you could have played cards on his coat-tails as he went down the street. A compromise was later effected, and the lead completed to Market street.

The entire city was rebuilt with pole leads, and the roof construction gradually disappeared. The general type of construction was 20-knob crossarms, and porcelain insulators upon which were strung No. 16 iron wires. Some of these leads carried as many as eight and ten crossarms. The poles in use were generally of square redwood, tapered, and as steps such as are now in use were unknown, climbing irons were used.

After the reconstruction in San Francisco, however, all poles were painted white. For a man to use climbers was then an unpardonable offense. As a consequence, trouble men had to carry 20-foot ladders. If they were unable to reach the lower crossarms they would have to shinny the balance of the way.

The streets of San Francisco during this period were nearly all macadamized, except the few instances downtown where round cobble stones were used. The dust from the macadamized streets and the salt fogs deposited a coating on the wires until they were nearly as large as a lead pencil, and formed a perfect insulation. It was a common occurrence to have a trouble man get a report of thirty or forty lines crossed in his district. By noon, however, after the sun had come out, most of these lines were cleared—not by any reason of activity on the part of the trouble man, but due to the assistance of old "Sol."

Considerable trouble was also experienced on account of the iron wire, which corroded very easily from the salt fogs, it being almost impossible for a lineman to climb a pole without shaking down the streaks of rust.

Development of the art soon overcame most of these conditions. The open wire was replaced by aerial cable, and later this was replactd by underground. The first underground was laid in 1892. Prior to that time, and in about 1885, the first transbay submarine cable to Oakland had been laid. The course is practically the same used by the present-day cable.

In 1894 the first party lines were installed in San Francisco, and in the same year, with the thought in mind of creating the telephone habit, kitchen telephones for outgoing service only were installed in the West district at the rate of 75 cents per month—the telephone in all cases being place in the kitchen, as its name indicates.

During these years there had been considerable development in toll line construction. The first toll line was built by John Lawrence in 1883 between San Francisco and San Jose and way points, and by 1890 we were able to talk to San Jose, Sacramento, Salinas, Petaluma, Stockton, and many other points. Charles Wallin had charge of the maintenance of toll lines, and directed the same from the long distance terminal room in San. Francisco.

In the early stages of this development there were no instruments as we have today to gauge the location of trouble. All tests were made by ringing on the line with a magneto bell. If it rang hard, the trouble was close; if easy, the line was either open or the trouble was at some distance. If unable to reach outside toll offices, a man was started from San Francisco

with instructions to keep on going until he found the trouble. These toll trouble men usually traveled by horse and buggy.

A system of maintenance of toll lines by patrols was inaugurated, using wagons carrying all classes of material. The lineman and helper took care of all minor repairs and reported back by wire daily as to their location to Mr. Wallin, in San Francisco.

This system was discontinued about 1906.

The first superimposed telegraph circuit was installed in 1892, between Hayward and San Francisco, and was used in passing calls for parties wanted by long distance. This system was gradually extended to all the larger exchanges in the territory, and today the majority of our long haul toll circuits are operated with superimposed telegraph.

The maintenance and installation work of the San Francisco exchange was handled by the construction department, at that time commonly known as "85"—that being the number assigned for all complaints. This department was headed by George Sawyer, later succeeded by Tom Gallagher, and in 1887 by P. B. Brown, who held this position for many years. Harry Hinds was also in charge of "85" for a long time, and his assistant was Charles Wall, who is now toll wire chief at Sacramento.

The No. 1 or "D" office trouble men were: Charles Hogan, Jack McClellan, J. H. Corcoran, Charles Gray, and Hector Boles; No. 2 office trouble men were in charge of Fred Wehe; No. 3 office trouble men, in charge of Mike Wall, were John and Jim Downing. John Downing is still with the company, in charge of a temporary disconnect wagon in San Francisco. No. 4 office trouble men were in charge of Charles Weddie. Frank Lawler, who then had charge of Mission and Butchertown offices, is still with the company in the right of way department.

The city construction work came under the supervision of C. J. Corcoran, who until recently was actively identified with the company, filling the position of general superintendent of construction.

Neal Prendergast and Mike Cody handled practically all line construction for new installations, with William Jeffers as installer. The second tap wagon was run by Jack and Harry Kenny, Jimmy Kearns being installer. In the city heavy construction gang were Billy Allenbaugh, Simon Flannigan, Bobby Atwood, Jim Hogan, Charles Maston, Mr. Hughes, who repaired the sidewalks, and William Gordon, noted as having assisted in the laying of the transatlantic cable, and who also laid submarine cable for the telephone company when there was any to be laid.

During the early period John Lawrence was superintendent of construction for the Sunset Company, his assistant being Flemon Drake.

Howard Keyser, now supervisor of right of way, was in those times identified with the Sunset Company, spending most of his time in the southern part of the state.

In charge of supplies was John Sullivan, a lovable old character, who had the esteem of every employee. His assistants were a Mr. Brooks and Mike Devers, who is now chief clerk to the superintendent of supplies.

The first operators were young men or boys, and in the small outside exchanges the manager was also switchboard man, outside construction man, installer, and trouble shooter, acting as relief operator during the day, and had to sleep at the central office so as to take care of night calls.

Among these pioneer operators were Peter, or better known as "Pinky" Shane, who now occupies a responsible position with the Fireman's Fund Insurance Company; Will Torpey, George J. Petty, now assistant treasurer; Billy Nixon, Bob Brauer, Tom Dunnigan, Charles Wall, and Billy Murphy. These men were telegraph operators as well, as all trunk assignments to branch exchanges were made by means of a telegraph call circuit, known as the "Sabin calling wire." This line was later equipped with telephone instruments.

In about 1881 the first women operators were employed, among these being Celia Perkins, Cora Perkins, Emma Peck (who was the late Mrs. L. H. Jacobi), Felicia Martin, Miss Wall (now Mrs. William J. Kennedy), Lena Jackson, May Petty, May Torpey, Daisy Gilkyson, Toni Kine, Julia Kine (who is still with the company in the auditing department), Nettie Paltangi, May Riordan, Miss Hartley (now toll chief operator in San Francisco), Alice Sheridan, Annie Nyne, Annie Randall, Nellie Wall, Jessie Cornell, Marion Fitzgerald, Tessie Lahaney, Rose Kenney, Ida Vaughn, and Mollie Martin.

The night force at that time were men, among them being Bobbie Gale, Leo Goodman, George Tullock, Tom Beston, Gene Bogle, and Ed Cleary.

The foundation of the present-day auditing and commercial departments was laid by such men as William G. Oliver, our first secretary and treasurer, who was succeeded by the incumbent, Fred W. Eaton.

Bookkeepers were Horace Ladd, Frank Monahan, Bob Mitchell, Herbert Dugan, John Margrave and Teddy Randall.

Collectors were William J. Cleary, who is still with the commercial department; Henry Ironberg, at present auditor of the St. Francis Hotel Company, and George Van Buren.

The sole canvasser at this time was L. H. Jacobi, who later became assistant superintendent and division superintendent, now retired.

The carrying out of the policies laid out by these men was left to such men as George J. Petty, John J. Flynn, John Mallin, and E. J. Zimmer, who was later made assistant to President Sabin, and afterward became vice president under Henry T. Scott.

In closing I wish to say that it is my earnest and sincere hope that the younger generation of today will appreciate that there are still greater opportunities for them in the development of the telephone industry of the future than was possible under the conditions presented to the old pioneer family.

Gas Masks Have Telephones

The European war has developed hundreds of new uses for inventions. To counteract the poisonous gas fumes blown toward a trench rescuers who are called upon to go forth and carry prostrate soldiers from their positions have guarded themselves against being overcome by a novel telephone appliance attached to the gas defying equipment. The rescuers are able to telephone for aid without removing their helmets or apparatus.

Audibility Current of a Telephone Receiver

Abstract of a Paper Read Before the American Physical Society

BY EDWARD W. WASHBURN

THE use of the telephone receiver as a detector for small alternating currents in wireless telegraphy, in many electrical measurements with the alternating current bridge, and for other purposes makes it desirable to have a simple and reliable method for determining the audibility current of a telephone. By audibility current is meant the current which must pass through the telephone in order to produce a sound which can just be recognized. The curve connecting the audibility current of a telephone with the frequency of the impressed E. M. F. is a valuable indication of the field of usefulness of the instrument and its availability for the above purposes.

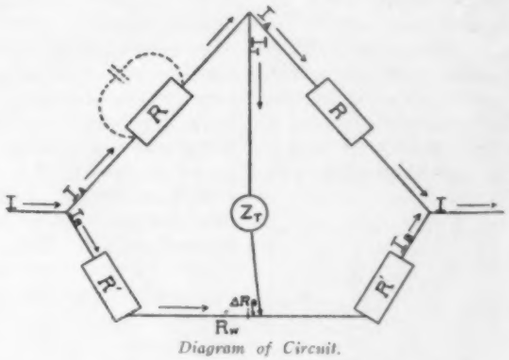


Diagram of Circuit.

The usual method of determining such a curve is first to measure the volt sensitivity of the telephone at various frequencies. This is usually done with the aid of a suitable slide wire connected in shunt across a non-inductive branch of an alternating current circuit provided with a hot wire ammeter. Having measured the volt sensitivity in this way the audibility current is then obtained by dividing the audibility voltage at each frequency by the impedance of the telephone for that frequency. Since, however, both the effective resistance and the inductive reactance of the telephone depend upon the frequency, it is necessary in this method to measure each of these quantities for each frequency. Moreover, as pointed out by Austin, it is doubtful whether the values thus obtained are strictly applicable for the purpose in hand, since they are measured with the aid of currents very much larger than the audibility current of the telephone. This uncertainty can be avoided and the whole determination much simplified by means of the following method based upon the equation of the Wheatstone bridge:

The set-up is shown in the accompanying figure. The resistances R and R' should be substantially free from both inductance and capacity. For low resistance telephones Curtis coils would fulfill this condition sufficiently well, but for high resistance telephones especially at the higher frequencies, film resistances would be preferable. The two resistances marked R' are connected by a stretched wire of suitable resistance R_W), provided with a scale and sliding contact. The telephone is connected to this sliding contact and to a point between the two resistances R as indicated.

A small variable air condenser connected where it is required is employed to insure the exact balancing of reactances. The resistance of that portion of the slide-wire lying between its central point and the position occupied by the sliding contact when the audibility current I_T is passing through the telephone, will be designated by $\triangle R_B$.

The current I comes from a high frequency generator whose frequency can be controlled and kept constant at any desired value. It enters the bridge network at the left and divides as indicated. In series with the bridge is placed a vacuum thermocouple (not shown in the figure) connected to a sensitive millivoltmeter. This instrument indicates the magnitude of the current I. For high resistance telephones a hot wire ammeter could be employed.

The procedure consists in adjusting the current I until the range of the silence on the slide-wire is found to have a convenient measurable value. This range of silence is obviously equal to $2\triangle R_B$ ohms. The value of I_T is then obtained from the equation of the Wheatstone bridge which is as follows:

$$I_T = \frac{2\triangle R_B R I}{A\ (A \times 2Z_T)}$$

where A is written in place of $R' + \frac{1}{2}R_W + R$.

This method would seem to involve a knowledge of Z_T, $(= R - JX\ )$ the impedance of the telephone, but this can obviously be avoided by making A so large that $2Z_T$ is negligible in comparison with it, or, so large that the D.-C resistance of the telephone may, with sufficient accuracy, be employed in place of its impedance. For low resistance telephones there will be no difficulty in doing this because the impedance of a low resistance telephone is ordinarily not more than two or three times its resistance even at fairly high frequencies. In the case of some of the very high resistance wireless telephones, where the impedance at 1,000 cycles may run up as high as 16,000 ohms it will, of course, be necessary to determine and employ an approximate value of its impedance. For an electrically tuned telephone Z_T in the above equation reduces to R_T, the effective resistance.

As an example of the determination of the audibility current of a telephone receiver by this method, the following values may be cited:

The high frequency generator was operated at a frequency of 990 cycles per second. Resistance boxes of Curtis coils were employed for obtaining the two resistances indicated by R, each box being set at 5,000 ohms. The value of $R' + \frac{1}{2}R_W$ was 125 ohms. The range of silence on the slide-wire was found to be $2\triangle R_B = 0.025$ ohm. The vacuum thermocouple indicated a current $1 = 0.4$ milliampere. The D.-C. resistance of the telephone was 170 ohms and its effective resistance at 1,000 cycles was 220 ohms, its impedance at this frequency being 290 ohms. For A we have, therefore, 5,125 ohms. The value of $2Z_T$ could evidently be neglected in comparison with 5,125 ohms; or, the value of $2R_T$, that is, 340 ohms could be used in place of it, since in either case the error involved would be less than ten per cent. Substituting these values in the above equation, we find that the audibility current of this telephone is 2.10-6 milliampere at 1,000 cycles.

Delay Is Fatal

The Independents Have Long Procrastinated; It Is Time to Act

BY TERRY W. ALLEN

THE hands of time never stop. Whether the things we do are right, just or fair, time has no mercy on our acts. It is the only thing that cannot be checked, that cannot be stopped, that cannot be turned back. History is writing furious pages at this time and just what part this great country of ours is playing in the world's arena is hardly now perceptible; but time will grind out our place and we will look back upon our accomplishments of today either with gladness or with sorrow as the results will show.

This week I attended the unveiling of a monument at Shiloh Battlefield, Pittsburg Landing, Tenn., one of the great battles of the Civil War. The Daughters of the Confederacy had builded a monument to the soldiers of the Confederate States, who lost their lives on that great battlefield. There was no joy particularly expressed in the dedication of this monument. The reason there was no joy was because of the fact that the battle of Shiloh was a defeat for the Confederate forces. Those familiar with this battle will remember how the Confederate forces forced the Union Army into the Tennessee River upon the first day, only to be defeated on the second day. It was a beautiful monument, a beautiful tribute of love and patriotism of the southern women to the soldiers who fought, bled and died for the principles in which they believed. There was a deeper feeling and deeper significance at the dedication of this monument than that which usually attends such a ceremony. This significance was the fact that this country of ours faces another crisis. We are a part of another war, and the part we play in this war will largely determine the future of our country.

Upon the face of this monument are two groups of heads carved in the granite that will be practically indestructible to the call of time. One of these groups represents the Confederate forces entering this battle with heads up, with hopes high as they marched into the conflict. The other group on the opposite side of the monument represents the defeated Confederate forces retreating from the battlefield. Fewer heads in number than upon the opposite side of the monument, and the head of the defeated forces are bowed, a typification of the humiliation that defeat brings.

It was a lovely day, not a cloud in the sky, and the cool May breezes swept over the fields and woods of this now peaceful battlefield, that in 1862 was filled with the dead and wounded. There was plenty of patriotism evidence at this gathering—the southern women are ready now to give their sons, and the old soldiers of the Confederacy are also willing to give their grandsons to a united nation, the United States of America. They said so feelingly. The old bitterness was gone from their thoughts. The South as much as any other section of this country can be counted on to do its part in the present war.

Possibly there seems to be no connection with the unveiling of this Confederate monument, and the sweeping of time and the position of Independent telephony in the telephone field. And yet there is a great significance. Not only that, but Independent telephony bears a very great resemblance to the conditions that governed this battle. Independent telephony can march triumphantly to victory against the Bell Telephone Company, if it is willing to continue the fight. Had the Confederate forces upon April 6, 1862, not ceased battle, victory would have perched upon her banners, but right when she had the fight won, right when victory was ready to place the olive wreath upon her head, the battle ceased and the next day it was too late. Reinforcements came for the Union forces and the opportunity to win the victory was snatched from the Confederate States. Independent telephony stands just in this position. If we will press on, if we will bring a suit against the Bell Telephone Company honestly, fearlessly, hopefully, and continue the fight, victory will perch upon our banners and Independent telephony's position will be secure. But if we delay, if we stop, if we hesitate, the opportunity will be snatched away and Independent telephony will march from the field beaten, whipped and discouraged, and a great industry will be tottering to destruction. We have the victory within our grasp; but have we the manhood, the stamina, the intelligence to carry it out to a successful conclusion? I believe we have and have always believed we have; I believe that we have temporized too much, delayed too much, that we have allowed too much time to elapse for the good of the industry we represent. But it is not to late to prceed intelligently and cnscientiously to victory.

Why it is that the majority of Independent telephone operators hesitate to take up the cudgel that is available (and that cudgel is the law) I have never been able to understand. Can it possibly be true that a majority of Independent telephone operators are desirous of amalgamating, if they can do so profitably to themselves, with the Bell Telephone Company? Can it be true that Independent telephony as an industry is unable to get the proper co-operation to achieve the rights that it is justly entitled to? Can it be possible that Independent telephony will allow the victory that it can achieve, and will achieve if it desires, to slip from its grasp because the owners of Independent telephone property in this country are so selfish that they will sacrifice their principles and honor and integrity in order that they may bring to a successful conclusion a trade with the Bell Telephone Company?

I would hate to think that this was true of the industry which I have the pleasure to represent, and yet, sometimes, I am almost forced to believe that selfishness, arrogance and greed govern more of us than do the principles of honor, integrity and uprightness of purpose. I hope that this condition will not last long, and that Independent telephony will demand and get its rights.

Let's bring a test case at once. If we are beaten by the law, then we can honestly say that we have done our duty. If we win, we can say the same; but we cannot say we have done our duty, that we have honestly represented the industry we were supposed to represent, unless we are willing to take some risk. Delays have always proved fatal. Let's not delay longer.

A franchise granted May 7 by the city of Seattle, Wash, to the Western Union Telegraph Company includes in its provisions the right to give long distance telephone service.

The Nerves of the Nation

New York Company's Vice President Tells of Service Problems

BY FRANK N. BETHELL

THERE is no getting away from the disturbing fact that, with the country's industrial machinery taxed far beyond its capacity, the telephone companies are confronted with a situation which may prove to be beyond their power to solve. There is no weakness in the telephone organization itself. Its finances, by reason of ability and forethought in financing, are prepared for the enormous demand for service that is upon us. The men of the organization know what to do and are prepared to do it. With men and money we are prepared; with material, for which we must depend on others, we are not prepared.

The manufacturers of equipment are of necessity in competition with manufacturers everywhere—for copper, for lead, for lumber, for all things that go into our construction. In our building operations we are in competition with all others for steel, for cement, for all building materials; high prices and slow deliveries seriously retard us. The delivery situation has become so serious that heavy materials, such as switchboards, built of lead and copper, and lead cable itself, are shipped from Chicago to New York by express.

Though the development of the telephone has been rapid over a period of twenty years, there came, with the war in Europe, an unprecedented demand, a demand which, contrary to expectations, has not diminished in the least, but, on the contrary, has in most localities continued to increase in volume. The year 1916 was a trying year for men and women in the telephone industry. With increasing difficulties in securing equipment, we were compelled in some cases to develop substitutes, particularly for materials in previous years secured from abroad.

In New York city we have been compelled in taking new business to connect the lines with a central office far removed from the central office serving the district in which the subscribers are located. This has of necessity been continued with a resulting increase in cost and increasing difficulty in operation and maintenance. The traffic flowing has increased to even a greater extent than the demand for new equipment. This has taxed the plant at times seriously, with reactions on the service resulting.

An idea of how the public has turned to the telephone in the past two years may be obtained from the records of the eastern group of Bell compnies. In 1915, there were 2,051,000 Bell telephones in the territory served by these companies. A year later there were 2,200,000 in service. We started this year with 2,393,000 telephones connected with our central offices.

To handle the traffic over our lines, we have had to increase our wire mileage in twelve months from around 5,850,000 miles to more than 6,265,000 miles of wire, and where two years ago we were handling 8,425,000 telephone connections of all sorts every day, we are now handling 9,875,000 connections. In 1916 we had 44,000 workers. We now have more than 55,000.

Our ability to provide reasonable good telephone service during this period is due entirely to the fact that we have in the past provided facilities beyond immediate requirements. This principle is absolutely essential in the proper development of any public utility. Our surplus plant has been exhausted as never before, and, for reasons already stated, it is difficult, of not impossible, at this time to provide for immediate demands. The time must come when surplus plant shall be restorted to normal.

In order to determine the amount of telephone equipment that shall be needed at various periods between 1917 and 1940, a careful study has been made in the eastern group of Bell telephone companies. Among the many factors considered in making this study, the estimated population is prominent.

In estimating the population of the country, which is our first step, we use the census figures for the entire country since 1870, and in making forecasts for groups and states and smaller units we use the census as far back as 1880. We divided the forecast of what the population will be in 1940 proportionately between the territory east and west of the Mississippi river. The eastern section is then divided into the Bell telephone of the territory east of the Mississippi. The eastern telephone group is then separated into the divisions of New York state, New Jersey, and the balance of the territory. The New York state in turn is separated into telephone areas known as the down-state and up-state sections. Still further subdivision gives us the population of New York City and of any other town, city, county, or any other particular telephone area we want. The figures are worked out on a basis of the relation of each group to the next larger body—the city to the country, the county to the state, the state to the group, and so on up to the relation of the territory east of the Mississippi to the country as a whole.

In 1940, according to our partially completed estimates, there should be 153,500,000 people in the United States, 66 per cent of them living east of the Mississippi. In the states where the eastern group of Bell telephone companies operate we expect to find, twenty-three years from now, about 46,000,000 people. New York state will have 19,000,000 people and New Jersey nearly 5,500,000.

The accuracy of our forecast may be shown by the fact that when the federal and state census takers and the New York city police census men about a year ago, determined upon a compromise figure for the population of New York city, to bring into reasonable accord the totals obtained by the three bodies, our estimate for the city was within a few thousands of the compromise figure. Our figures for the boroughs of Queens, Richmond, and the Bronx coincided almost exactly with those of the census takers.

New York City's population growth, as seen by telephone engineers, will be rapid in the next twenty years. In 1940 we expect to be serving telephone users in a city of more than 11,500,000 people. We expect the population of Manhattan borough to be 2,900,000 in 1920, and 3,400,000 in 1940. We believe the Bronx will more than double its population by 1930. It increased its population from 200,000 to 431,000 between 1900 and 1910, and we expect it to have 875,000 people in 1920, about 1,400,000 in 1930, and approximately 2,000,000 in 1940.

According to our figures, Brooklyn should have a population of 2,250,000 in 1920 and only 40,000 less than 4,000,000 in 1940. For Queens we anticipate a growth to 537,000 in 1920; to 1,024,000 in 1930 and to 1,900,000 in 1940. Richmond should be a borough containing 111,000 people in 1920, and 270,000 in 1940.

To provide telephone service for this great population, a great deal of new equipment must be provided, new workers must be trained and new provisions must be made for handling the tremendous volume of traffic that will flow between interurban points and into and out of the city. The necessary plans are now being made, and they involve studies that go into the subject even in the smallest details.

To give a concrete example of our problem, we are now seeking the best way to serve 380,000 telephones that are expected to be used by the 2,000,000 people in the Bronx in 1940. We will need twice as many central offices as there are in the borough today. We must forecast the volume and trend of telephone traffic in and out of the Bronx in relation to the other parts of the city's telephone system and then seek an ideal arrangement for handling this traffic from the standpoints of efficiency and economy.

Our problem of the future is just as big and just as important as that of the present, which is aggravated by the unusual business conditions, and we are now making the plans for handling it in the way that has made American telephone service the best in the world.

Oregon Men Reject Interconnection

The proposed interchange of telephone service which is to be a city ballot measure in Portland, Ore., June 4, was adversely reported on by a committee jointly representing the Progressive Business Men's club and the City club. Both clubs were urged by the committee to organize an aggressive campaign against the measure. It was announced that the executive boards of both organizations had already adopted the report, but a motion that the body of the Progressive Business Men's club adopt the report was superseded by a motion to defer action for one week until members of the club could have opportunity to check up the citation of facts contained in it.

That the report opposing compulsory interchange of telephone service was made only after exhaustive consideration of all the facts, and in a spirit of fairness to both telephone companies and the Public Service League, was stated by H. N. Lawrie, chairman of the special committee of the Progressive Business Men's and City clubs.

"On April 7 the petition for interchange of telephonic service initiated by the Public Service league was first made public, so that the necessary signatures could be obtained to place it upon the June election ballot," said Mr. Lawrie. "On that day the telephone committee of the Progressive Business Men's club presented a report which recommended that the matter of interchange should be left to the public service commission of Oregon for its final decision.

"This report cited the fact that on September 11, 1915, a complaint was filed to enforce interchange of telephone service in Portland by the Public Service league. The committee was aware at this time that the delay of the Oregon public service commission was due to the delay of the Home Telephone Company in not making available to the commission its statement of plant and equipment valuation. The Pacific Company's statement of valuation has been in for some time and has been checked by the commission.

"Without this information as a basis, the public service commission could not render an opinion as to the complaint. This indicates a disposition on the part of the Home Telephone Company to delay the issue and decision of the commission.

"On April 7 the report was filed and the committee instructed by the club to prepare a report on the new ordinance to enforce interchange of telephonic service. I called upon Mr. Phillips of the Pacific company and asked him to prepare a statement of the views of his company on the ordinance. The same afternoon I called upon Mr. Middleton of the Home company and asked him for a similar statement of the views of his company. He replied that the Home company was not interested in the interchange ordinance and did not care to express an opinion. Mr. Middleton did, however, refer me to Oswald West, attorney for the Public Service league, whom he thought would be willing to present a statement in defense of its own initiated ordinance. Mr. West sent me references on the subject, none of which was of later date than 1915. He failed to present any written argument such as was called for. For the reasons that both the Home Telephone company and the Public Service league did not respond to a request for written statements, the telephone committee was forced to abandon the idea of open debate before the club. The Pacific company has been ready and expressed its willingness to appear at any time and debate the issue before the club.

"The Progressive Business Men's club has always been for open debate in any public matter and would still welcome such debate with all parties concerned present. It would seem however, that the Public Service league and Home Telephone Company have, since the telephone committee rendered its report against interchange to the club, come to a sudden conclusion that they should defend their position. The opportunity will no doubt be granted them."

Telephonic Reception of Cable Messages

It appears now that the telephone receiver may take the place of the Kelvin siphon recorder in the reception of cable messages at no distant date. Recently a number of experiments were carried out under the direction of Lieut.-Col. G. O. Squier, in which the receiving apparatus made use of the "ticker" principle and the audion, both of which figure prominently in the wireless apparatus of today. The cable used for the test was 1,086 miles long, and the actual receiver was an ordinary telephone. The feeble current received was broken up by means of the sliding contact "ticker" and rendered audible, and in order to secure greater sensibility, a tuned audion amplifier was used in connection with the "ticker." It is reported that the sensitiveness of the apparatus is so great that less than one-twentieth of the voltage necessary for operating the siphon recorder is sufficient to give good traffic signals.

Small Town Stuff

LaGrange, Ohio, was shut off from telephone communication with the outside world for several days, because Mrs. Goldie and daughter, who for years have been operating the telephone exchange there, moved from the village. The exchange was located in the house occupied by the Goldies.

Saving Labor on Pole Holes

The Use of Explosives as a Substitute for Digging in Various Sorts of Soil

BY J. B. STONEKING

PRESENT DAY conditions of labor shortage and costs and the extreme difficulty of organizing and keeping good, efficient telephone and electric light pole line construction gangs have caused a considerable delay in the work, and in many cases an absolute curtailment of construction work on line extensions. Engineers and contractors on this class of work have been endeavoring to perfect mechanical and other saving devices to overcome this deficiency in labor.

Many machines for digging pole holes have been worked out and are meeting with a certain measure of success. Generally speaking, these machines have limitations and certain weaknesses to be overcome before they will give unqualified and satisfactory service. A machine that will give excellent results in a certain sized hole in a given type of soil will fail utterly when required to face other conditions. The range of various conditions which such a device must meet, its portability, ease, and cost of operation and maintenance, amount of work to be done, and the first cost of the machine are the governing factors to be considered. Up to the present, these qualifications have not been successfully met and combined in any single machine.

Where poles must be set in rock, dynamite has long been used as the only successful method of making holes, and this method is being quite largely adopted by contractors and construction foremen for nearly all sorts of soils except in easily worked sand and loam. The use of explosives for making pole holes in material other than rock has grown slowly, due to the fact that labor was plentiful and cheap, good results were not always obtained by inexperienced loading of the dynamite, and many engineers contended on theory that the ground would be so loosened as to make firm tamping of the earth around the butt of the pole impossible.

My attention was first called to the practicability of the dynamite method of hole digging by an old miner on some telephone line construction in Montana, where the men were paid a certain sum per hole. The soil was a clay loam slightly moist, but firm enough to require barring in digging the material. A bar was driven thirty inches into the ground to make a hole for the dynamite, from one-fourth to one-half pound of which was used per hole, generally without tamping, but in some cases in more compact material a short plug of wet clay was used. A bridge of earth was left over the cavity formed by the explosion, but a few blows with a shovel caved this in and the debris was removed from the bottom. A good hole from ten to fourteen inches in diameter and from three to three and one-half feet deep, when cleaned, was obtained, the sides and bottom being well compacted. The miner was enabled by this means to complete nearly twice as many holes per day as any other man in the digging crew.

Later trials in different soils have shown that what is a good loading practice for one condition does not always hold true for others, and it is necessary to shoot a few holes in order to arrive at a correct loading.

Better results have been obtained by removing the top earth to a depth of several inches and to the diameter of the pole hole desired before making the bore hole for the dynamite. This has the effect of relieving the pressure and diminishing the formation of the bridge over the cavity. In making the holes for the dynamite a punch bar driven by hammers, a soil auger, with a long handle, or a churn drill are generally used, although the large telephone company uses a specially made hollow pipe drill htat is churned up and down, doing very effective work in clay soils, enough water being used to make a thin mud.

For deeper work, up to six and one-half feet, very good holes are made by tying small pieces of from one-eighth to one-half cartridge to a small straight lath or stick, starting at the bottom end and spacing them about six to twelve inches apart, leaving the last piece about eighteen to tweny-four inches below the top of the ground.

This distributes the charge along the entire hole and packs the earth tightly against the sides, leaving a cavity from twelve to eighteen inches in diameter. Sometimes the dynamite is inserted into a long roll or cylinder of heavy stiff paper and held in place by sticking pins through it, or by cutting short sticks the length it is desired to space the cartridges. Care should always be taken not to allow earth to fall into and close the hole between the cartridges, for this has a tendency to break the detonating wave from one cartridge to another, and may result in misfires.

Ordinarily no tamping is necessary, but for harder material a small amount of tamping has the effect of confiining the gases formed in the explosion and forcing them to do more work laterally. Tamping generally leaves a bridge over the cavity. By varying the size of the cartridges, the spacing apart along the hole, and the amount of tamping, in a few trial holes the engineer is able to obtain a system of loading to fit almost any condition.

For a pole line constructed through a district where the soil was hard clay, very slightly moist, the following loading gave excellent results for four and one-half foot holes:

One-third cartridge in bottom; one-third cartridge twelve inches above; and one-third cartridge twelve inches further up; no tamping.

In another section, the soil was a heavy, plastic, water-saturated clay and holes six feet deep were wanted for large poles. The best loading in this case was found to be seven, one-quarter cartridges spaced six inches apart.

In general, the quicker acting dynamites make better holes than the slower acting, heavy grades, a 40 per cent to 50 per cent "Straight" grade being used in summer and a 40 per cent to 60 per cent "Low-Freezing Extra" being used in winter when there is some liability of the dynamite becoming chilled or frozen.

Due to the wide adaptability and elasticity of this method of digging holes, the quickness, absence of high first cost for equipment and overhead charges for maintenance, and low cost per hole, as compared to hand labor, it has met with much favor by engineers and contractors who have given it a thorough trial.

CHEAPER EXCAVATION

Contractors and engineers generally are feeling the acute labor shortage, especially of the cheaper labor which is used quite extensively in excavation work, such as building foundations, basements, cellars, water storage reservoirs, trenching, and cuts in street, road and railroad construction. The number of newly arrived immigrants from which the supply for this class of labor was largely drawn has been very materially affected by the European war. This same cause is largely responsible for the demand for skilled labor like machinists and iron and steel workers, and the interest shown by manufacturers in drawing upon and training the unskilled men to fill their needs. Also, the increased wages paid to skilled workers has caused a general feeling of unrest in labor circles, which, coupled with the constantly increasing cost of living, and the insufficient supply of ordinary labor, has caused the demand and the necessity for higher wages.

In general excavation work, labor forms a very important part and one of the most variable items of cost entering into the contractors' or engineers' estimates on a "job." Hence, they are looking for and quickly seize upon any good method of saving labor, frequently developing or adapting ways and means to their needs which have been very successful in keeping down costs and enabling them to "break even" on their bids.

Probably the chiefest of these is the development and use of the lower grades of dynamite, which is rapidly finding favor among men in this line of work. In rock, the efficiency and necessity of using dynamite has long been recognized, but when this high grade explosive was used in earth excavation work, the results were far from being satisfactory. This is due to the character of the material being worked, rock work requiring a quick-acting, shattering force to give results, while in earth a comparatively slower-acting and heaving or lifting effect is desired. Recognizing the necessity for an explosive of this kind, the manufacturers have worked out a low-grade, slow-acting, heaving, comparatively insensitive and safe to handle, low-freezing dynamite which contractors have been quick to adopt in their search for an efficient means of cutting down labor costs. It is used in conjunction and in combination with all types of mechanical excavators to hasten, aid, and cheapen the work. In this connection the method generally pursued is to do the drilling or punching of the bore holes, and the firing at a time when it will not interfere with the other operations.

On large projects, even where the steam shovel is used, it is generally necessary to loosen the material by blasting ahead of the shovel where large imbedded boulders, compacted earth, or hard-pan are encountered. In order to secure the maximum efficiency of the machine, the shovel must be filled at every trip, hence it is not advisable to make the shovel do very much digging in hard material to fill it, as the yardage handled will be too low for any profit. Often the use of a little dynamite on large boulders, old water mains, large roots, stumps, and other obstructions will save a broken cable and consequent delays. On work such as excavations for bridge piers in dry ground, and foundations for large columns and statues which are comparatively deep and of small area, good results can frequently be obtained by loosening up the bottom with blasts and removing by means of a clam shell or orange peel bucket rig.

For smaller operations or on those which, by their nature, do not permit of the use of the more expensive large machinery, and which depend more on some sort of plowing to loosen the material, the amount of hand labor required is greater and hence more necessary for the use of labor savers. In shallow excavations where the material is not too hard to plow successfully and where ample room may be had in which to turn, the horse or tractor drawn elevator grader gives good results. The use of the wheeled scraper, buck scraper, slip, and "Fresno" scrapers are limited to very soft material, hence plowing to loosen same is essential. In hard ground, or where there are boulders, roots, stumps, or hardpan, plowing becomes very unsatisfactory and costly, and sometimes, impossible. By the proper use of dynamite the plowing may be dispensed with entirely at a considerable saving, and, even in easily plowed ground where it is desired to leave the banks and corners of the excavation perpendicular, a great amount of hand picking and shoveling may be saved by blasting out the corners and sloping toes.

Where the work is very small or the areas too restricted for the use of teams in plowing, the question of hand labor is a very serious one. The pick or mattox and the shovel form the principal tools. At best, this method is a very slow and costly operation, and if any other possible way can be used successfully, it is generally wise to adopt it. Low-grade dynamite is the salvation of the contractor in this case, and its successful and rational use has been the turning point from loss to profit.

If possible to put it off, excavation work should not be done while the ground is frozen, for the costs are considerably increased, however, in some cases, the work must be prosecuted vigorously regardless of weather conditions, and in working "frost" the most efficient labor-saver is the low-freezing dynamite. Care should be taken not to blast too far ahead of the shovel and the scrapers or the material may consolidate again.

1735 Companies in Minnesota

Minnesota is the home of 1,735 telephone companies, according to the second annual report of the state supervisor of telephones, J. W. Howatt, to the Minnesota railroad and warehouse commission. The number includes farmers' mutual lines.

In the last year, 364 cases were filed with the commission. These consisted of complaints against telephone rates and service, petitions for the installation of telephones in railway stations, applications for changes in rates, rules and regulations, applications for permission to purchase telephone property and similar proceedings. The commission issued 75 indeterminate permits to operate telephone exchanges in cities and in incorporated villages. Twenty-six applications for permission to purchase telephone property of various kinds were granted, and 31 railway stations in different parts of the state were supplied with telephone service through the orders of the commission, the orders being based on petitions from citizens of the respective communities.—Tristate Company's Magazine, *"Our Emblem."*

New York Has Rate Determination Bill

A bill has been introduced in the New York state legislature amending the public service commission law by providing that in determining what rates for telephone and telegraph service are reasonable, the commission must consider what would be a reasonable average return upon the value of all the property actually used by the public service within the state and of the necessity of making reservation out of income, out of surplus and contingencies.

The Toledo Labor Case

Judge Killits in U. S. District Court—Northern District of Ohio, Western Division

DECEMBER 12, 1916, A. C. Stephens and others, each claiming a cause of action similar in character and occasion to that offered by every other, and alleging that they were suing in a representative capacity in behalf of numerous other persons similarly situated, filed a complaint in this court against the Ohio State Telephone Company, a corporation organized under the laws of Ohio, and doing business in Toledo, of which city each of the complainants is a resident.

The complaint asserts that the defendant is engaged in the business of transmission of messages to points within and without the State of Ohio over telephone lines and cables of its own extending into neighboring states, and through its connections with other companies, and that each of the complainants, and each of the numerous persons in whose behalf also the complainants profess to act, are patrons of said telephone company with an interest as such in the maintenance of its facilities for interstate communication by virtue of their several contracts with defendant whereby complainants, severally, are entitled to enjoy local and long-distance telephone facilities to points within and without the State of Ohio.

It is further alleged that the defendant is obligated by the terms of its charter and franchise for the use of the streets of Toledo to furnish adequate facilities for telephonic communication to points in the city and within and without the State of Ohio to all persons willing to pay the fixed charges prescribed for such services by the company; that it has over 20,000 telephones connected in the City of Toledo with central exchanges by the usual and necessary wires and other constructions, and maintains a so-called "long-distance" exchange physically connected by wires and other instrumentalities to similar long-distance exchanges and central exchanges located in many cities, villages and towns in the State of Ohio and in adjoining states, and that thereby the defendant company serves the community as an instrumentality of interstate commerce; that the defendant company has suffered and permitted its lines, cables and other facilities to become so greatly out of repair that it is impossible for complainants to obtain and to have service for which they pay and which defendant is obligated to furnish, and that it has become impossible for the patrons of the telephone company to have reasonably full use of the company's lines; that at twenty-five or more places in the city, designated in the complaint, defendant's lines and cables have become cut and are permitted to remain out of repair, to the end that over 2,500 patrons of the defendant company have been entirely deprived of telephone service, including many of the prominent manufacturing and business establishments of the city, in some of which the complainants are severally interested; that the working force of the defendant company, of operators, linemen, repairmen, has been permitted by the company to become so depleted that it is unable to and fails to keep its lines and facilities in reasonable repair, and that the situation presents a matter of grave concern to the prosperity and well-being of the City of Toledo and its inhabitants, including the several complainants, in that the legitimate business and commerce of the city to points within and without the State of Ohio are seriously and very largely interfered with to the very great damage of community interests; that the complainants have no adequate remedy at law, and that the defendant indicates neither ability nor disposition to comply with the requirements of the several contracts alluded to, and with the obligation to maintain adequate facilities for intra and interstate communication.

It is asked, therefore, that the company be cited to answer the bill, that a preliminary order be issued to the defendant requiring the defendant to immediately repair and put its plants, lines, wires and facilities in reasonable order and condition for operation, and to observe its duties and obligations as an interstate carrier and as a public utility under the several Act of Congress and its contracts; and that it be determined and decreed that the rights and interests of the public and of the complainants, representing the public, are paramount in all respects to the private interests of the defendant, its officers and employes and all other persons whomsoever.

A few days after the filing of this complaint, a Michigan corporation, known as the Home Telephone Company of Grass Lake, filed a complaint against the Ohio State Telephone Company, alleging substantially the same condition of affairs as in the former complaint, with additional circumstances, setting forth the Michigan corporation's particular interest in the maintenance of the facilities and obligations of the local company, because the latter is the medium by which the former company maintains its inter-state long-distance communication with points in the State of Ohio, and that its business in Ohio was interrupted by the failure of defendant to maintain its lines in proper repair.

Before any action was taken by the court these cases were consolidated, and thereupon the court, after notice, found that "within the past three weeks the cables of defendant company have been cut, damaged or destroyed" at the several points set forth in the complaint, and that this situation was the result of depredations by divers persons unknown to the telephone company; that thereby followed large but unascertainable losses of money and business to the complainants and others and the community, and an interruption of the free flow of inter-state commerce; that the defendant company should immediately proceed to the repairing of the several cables located at or about the places mentioned in the order and should thereafter maintain and keep all other cables, lines and wires, and appliances in good state of repair and in condition for operation. Then followed this provision:

"It is further ordered, adjudged and decreed that the defendant company, its officers, agents, servants and employes, those in concert or participating with them, and all persons whatsoever, and particularly all persons having notice of this order, be and are hereby enjoined and restrained from interfering in any way, or in any manner, with the cables hereinbefore enumerated, or with the repair of said cables, or with workmen engaged in repairing said cables, or with employes of defendant company when in the company's service; and all said persons and parties are enjoined and restrained from doing any acts or things which may interfere in any respect with the performance of the duties and obligations of the defendant company as a common-carrier."

The answer of the defendant company filed some time after the entering of the preliminary order admitted many of the allegations of the complaint, but, putting the complainants upon proof as to many others of important character, which need not be discussed here, set up the fact by way of excuse that it was suffering a strike on the part of its operators and linemen, and that it was having great difficulty in maintaining its working force because its striking employes and their sympathizers were conspiring and combining to prevent the defendant from continuing in the operation of its telephone system and from employing operators, linemen, cablemen and other electrical workers to repair the lines upon which depredation had taken place, and from maintaining the facilities of the company in operation; that their loyal employes were subjected to intimidation, abuse and violence, and that its cables and lines were being destroyed and cut as charged in the complaints by the striking employes and their sympathizers.

Prior to the coming in of this answer, however, one Bert Hoffman, representing himself as a resident of the City of Toledo, applied for leave to intervene by answer and intervening petition in behalf of himself and the several members of Local 245 of the International Brotherhood of Electrical Workers of which he was a member, and in behalf of said Union. After a finding that he did in fact sue in behalf of the said Union and its members permission was granted, and his answer and intervening petition allowed to be filed.

In these, admissions were made of substantially the facts set forth in the complaints, except that Hoffman denied that either he or any of the parties for whom he attempted to speak were guilty of the depredations of the lines and facilities of the defendant company.

An attempt was made also in Hoffman's pleadings to raise the merits of the labor controversy between the striking employes and the company, an issue which the court has not yet considered.

Hoffman's pleadings in behalf of himself and his fellows assert their intention,

"To do and perform, singly and in concert with others by peaceful and lawful means all acts which he is able to perform by peaceful and lawful means, to compel said company to re-employ its striking employes and to establish fair wages and

decent working conditions; that until said company shall comply with said demands of its employes, this petitioner will, in every peaceable and lawful manner possible, interfere with the business of said telephone company."

The order permitting Hoffman to file his intervening petition and his answer in behalf of himself and his fellow members of the union, and of the union, contains a stipulation of his counsel with the counsel of all the parties to the cause:

"That the order heretofore entered in this suit upon December 14, 1916 (the temporary order above referred to), shall be and remain in full force and effect as a preliminary injunction until the further order of this court, and that said order be observed and respected in all things until the further order of this court."

After the temporary restraining order had become a temporary mandatory injunction in the language above quoted, to which all the parties consented, including the union men, as above stated, testimony was had before the court in several instances, pursuant to the last provision of Section 22 of the Act of October 15, 1914, commonly known as the "Clayton Act," which testimony tended to suggest violations of the provisions thereof by various parties, including Hoffman, the representative defendant himself. Attachments were issued based upon this testimony and subsequently informations were filed by direction of the court. The parties arrested thereon were admitted to bail in amounts of from $100.00 to $400.00, and the court has now before it the return of the several respondents to the respective informations. As the returns raise practically the same questions in each instance, for the purpose of this opinion we will consider only that of Gustav M. Bugniazet, one of the vice-presidents of the International Order of Electrical Workers, who had been in charge of the alleged strike among the employes of the defendant telephone company. The points raised by this return, which we deem worthy of special consideration at this time are,

First, the jurisdiction of the court to entertain an action attempted to be brought by patrons holding contract relations with the Ohio State Telephone Company under circumstances such as obtain here is questioned;

Second, that the terms of the injunction are too broad and indefinite to be valid under the provisions of Sections 19 and 20 of the so-called "Clayton Act," which, it is insisted, exclusively control the court in this case.

Respecting the first contention, it is urged that jurisdiction is lacking because the suits are collusive, and because there is a lack of jurrisdiction, on the theory that legal remedies are present. and because the court is asked to undertake administrative and legislative functions.

Respecting the second position taken by respondent, it is urged that the order attempted to restrain employes of the telephone company and persons seeking employment therewith from attending in places where they may lawfully be for the purpose of peacefully obtaining and communicating information, peacefully persuading persons to abstain and cease working for the telephone company, and from doing acts which might lawfully be done in the absence of such dispute concerning terms and conditions of employment, contrary to the provisions of Section 20 of the Clayton Act, and that the order did not describe in such reasonable detail the act of the acts of the parties to be restrained as provided by Section 19 of the so-called "Clayton Act."

In argument it is urged with considerable insistence that the court has before it a case squarely within the provisions of Sections 19 and 20, and particularly the latter, of the Act of October 15, 1914.

There is no evidence of collusion between the parties in this case; that the original parties may be friendly antagonists is not, however, improbable; counsel's surmise may be correct, but something more than this is necessary to make their "collusion" reprehensible. The court will not concern itself with the fact, if it exists, that the parties to the cause have agreed to submit their alleged controversy to this court; if there is nothing in substance to support the theory of collusion other than that, the fact is of no consequence. Provided a real controversy between the parties exists, and the same elements of jurisdiction obtain as if the action were forced upon the defendant by the plaintiff, the court will not inquire into the reason why the parties to the cause entered into an agreement, if they did, to bring their action in this court in any form. *Ashley vs. Supervisors*, 83 *Fed. Rep.* 534; *Manufacturing Co. vs. Kelly*, 160 *U. S.* 327. *Re Railway Receivership*, 208 *U. S.* 90, 110, 111. It is when the collusive agreement extends to an adjustment of the situation so as to apparently clothe the court with jurisdiction which it otherwise would not have that it becomes obnoxious, so that the real inquiry here is the inquiry as to jurisdiction upon the facts alleged, and if it is found that the court is asked to consider a cause of action which exists as one within its jurisdiction, no matter what the parties thereto determine to do with it, we are not interested to ask why they presented it to this court. Section 37 of the Judicial Code is addressed to that form of collusion which is entered into "for the purpose of *creating* a case cognizable" under the Code. The statute is not new; it was the law under consideration in the cases cited, and it is not understood to refer to an agreement to submit a real controversy over facts not of the making of the alleged colluding parties, but to the collusive establishment, for the purposes of a suit, of facts in controversy which otherwise would have had no existence.

Counsel first insist that the complaints present no cause of equitable cognizance because the complainants have a complete and adequate remedy at law; wherefore, under favor of Section 267 of the Judicial Code, this suit is not sustainable. It is suggested that each of the complainants might find relief through appeal to the Interstate Commerce Commission, or through appeal to the Ohio State Utilities Board, or in an action for damages, or by an action in mandamus.

Assuming for the sake of arguing counsel's position that any individual complainant might have a remedy at law through one of the methods suggested, still that mere fact does not suffice to make the situation here unrecognizable in equity. It is a *complete and adequate remedy at law*, only, which will oust equitable jurisdiction. The Supreme Court, in *Walla Walla vs. Walla Walla Water Co.*, 172 *U. S.* 1, announced the rule as follows:

"This court has repeatedly declared in affirmance of the generally accepted proposition that the remedy at law, in order to exclude a concurrent remedy in equity, must be as complete, as practical, and as efficient to the ends of justice and its prompt administration as the remedy in equity. * * * Where irreparable injury is threatened, or the damage be of such a nature that it cannot be adequately compensated by an action at law, or is such as, from its continuance, to occasion a constantly recurring grievance, the party is not ousted of his remedy by injunction."

The condition which complainants picture is one which affects not only each one of them individually, but which affects the entire public. It is obvious, assuming that the complaints state the truth, that an extension of the damage done to the properties of the defendant company in any material degree beyond what is stated in the complaints would approximate a public calamity, if that state of affairs does not already exist. While each individual complainant was carrying his complaint through the slow processes of any legal remedy, which ever one of those enumerated by counsel for respondent should be chosen, an intolerable public situation would remain and doubtless be enhanced in its calamitous features.

Assuming that any one of the complainants might be compensated for his damages in an action at law, while he was having those damages ascertained, following legal proceedure, they would be continuing and increasing not only as to him up to the day of trial, but as to every contract-holder of the company, for his contract would entitle him to service with every other contract-holder. While the alternative rule in mandamus was running, if one should be granted, which would be, of course, only against the defendant company, there would be no restraint upon the continuing action of irresponsible people who were placing the company at the mercy of an order in mandamus. No remedy at law would be possible either against probable but then unknown wrongdoers. Some of the remedies suggested involve of necessity a multiplicity of suits which, when brought, would be effective only touching the particular actions and would not reach recurring conditions involving new causes of action. Even if there were remedies at law available to complainants, individually or collectively, or to the public, it is very plain that none was adequate to meet this situation, for no remedy had in it that celerity and comprehensiveness of operation which mark an injunction order and which such a situation as this required in order that there may be any adequacy at all in the remedy. While the public represented by complainants, was awaiting the necessarily slow processes of law, where would the public service have been? The futility of a resort to any suggested legal remedy to meet the situation alleged in the complaints is too plain to need any further argument.

In 1910 (Act of June 18, Section 7) the Interstate Commerce Act of 1887, and subsequently amended, was further amended to the effect that,

"The provisions of this act shall apply to telegraph, telephone and cable companies (whether wire or wireless) engaged in sending messages from one state, territory or district of the United States to any other state, territory or district of the United States, or to any foreign country, who shall be considered and held to be common carriers within the meaning and purpose of this act."

It seems to be clear that the purpose of Congress in this enactment was to classify such corporations as the defendant here, for all purposes so far as the administration of the laws of the United States is concerned, with railroads and other transportation common carriers, for the laws pertaining to interstate commerce, while generally providing for matters of administration of the duties of instrumentalities of interstate commerce towards the public, yet comprehensibly bring them within the jurisdiction of the federal courts for all purposes relating especially to their duties as interstate agencies.

We cite this Act, therefore, to the point that all decisions touching the jurisdiction of the federal courts under the laws relating to interstate commerce are applicable to situations arising with reference to telephone and telegraph companies, and that we may assimilate controversies respecting interstate traffic by telephone and telegraph with those which deal with transportation of goods and persons.

It probably would not be disputed, at least it is not subject to dispute, that the Acts of Congress regulating interstate traffic are intended to, and do, so far as it is possible for mere enactments to accomplish anything, secure to the public the effective performance of the duties imposed upon public utilities by virtue of their contracts and those public engagements which result from their franchises.

It was long ago held by the declaration of the Supreme Court that telegraph lines, when extending from state to state, were instruments of commerce under the protection of Section 8 of Article 1 of the Constitution—the commerce provision—and that messages transmitted over such lines from one state to another constitute interstate commerce. *Pensacola Telegraph Co. vs. Western Union Telegraph Co.*, 96 *U. S.* 1; *Telegraph Co. vs. Texas*, 105 *U. S.* 460; *Western Union Telegraph Co. vs. Pendleton*, 122 *U. S.* 347.

It has also become the settled law by adjudication, as well as in many states by statutory enactment, that for all purposes respecting the rights of the public, a telephone company must be treated in the same manner as a telegraph company. The Federal Act of 1910, cited above, is effective also to that end.

The several sections of the Interstate Commerce Act, as enacted in 1887, and amended in 1889 and 1910, require telephone companies to afford all reasonable facilities for the transaction of business for which they are chartered and which they engage to carry on through their contracts, and subjects them, as in case of other instrumentalities of interstate traffic, to heavy penalties for failure to comply with these obligations. As we read the statutes, the same law and procedure are applicable to them which safeguard public and private interests in the operation of any other business engaging in interstate commerce, and we find the jurisdiction of the federal courts over analogous controversies upheld by a long line of decisions touching so great a variety of phases of dereliction that we may safely say we have here one belonging to the same category. We cite: *Chicago, B. & Q. Ry. Co. vs. Burlington, C. R. & N. Ry. Co., et al.*, 34 *Fed. Rep.* 481; *Toledo, A. A. & N. M. Ry. Co. vs. Pennsylvania Co., et al.*, 54 *Fed. Rep.* 730; *Toledo, A. A. & N. M. Ry. Co. vs. Pennsylvania Co., et al.*, 54 *Fed. Rep.* 746; *Wabash R. Co. vs. Hannahan, et al.*, 121 *Fed.* 563; *Sunderland Bros., et al. vs. Chicago, R. I. & P. Ry. Co., et al.*, 158 *Fed. Rep.* 877; *Northern Pac Ry. Co., et al. vs. Pacific Coast Lumber Mfrs.' Ass'n, et al.*, 165 *Fed. Rep.* 1; *Cleveland, C. C. & St. L. Ry. Co. vs. Hirsch*, 204 *Fed.* 849; *Alaska S. S. Co. vs. International Longshoremen's Ass'n of Puget Sound, et al.*, 236 *Fed.* 964; *In re Lennon*, 166 *U. S.* 548; *Western Union Telegraph Company vs. James*, 162 *U. S.* 650; *Southern Railway Company vs. Tift*, 206 *U. S.* 428; *Macon Grocery Company vs. Atlantic Coast Line Railroad Company*, 215 *U. S.* 501; *Louisville & Nashville Railroad Co. vs. F. W. Cook Brewing Co.*, 223 *U. S.* 70; *United States vs. Pennsylvania Railroad Co., decided December* 11, 1916, 37 *Supreme Court Reporter*, 95.

Extended comment upon these cases is unnecessary. We may note, however, that in the Tift case (206 *U. S.* 428) the court held that although an action at law for damages to recover unreasonable rates existed, the federal court could entertain a bill in equity to restrain the enforcement of an unreasonable schedule of rates; and in the case last cited (*United States vs. Pennsylvania Company*) it was held that the Interstate Commerce Act does not give the Interstate Commerce Commission power to direct a railroad company to provide reasonable facilities for service, that is, that the Act does not give the Commission the power to enforce the provision that "it shall be the duty of every carrier * * * to provide and furnish such transportation upon reasonable requests therefor," but that such power is lodged only in the courts (see same case, 227 *Fed.* 911). So also in the beer case (223 *U. S.* 70) it was held that the refusal of a common carrier to accept a certain class of freight did not give rise to an administrative controversy within the jurisdiction of the Interstate Commerce Commission, but created a question to be determined only by a court. The criterion is the presence of a controversy arising under the laws of the United States. We feel that we are entirely justified upon this current of authority in holding that we have such a controversy here.

As the court is not asked to perform an administrative act, so we are unable to see with counsel that it is asked "to legislate and fix the quality of service required to be given by the defendant company, not only that the present service is inadequate, but as fixing the standard of service which will be required of the company." We see no application to the instant situation of any of counsel's authorities on this subject. It seems to us that this is plain from a consideration of the order issued which follows the prayer of the complaint and which reads in its material parts as follow:

"The court finds that within the past three weeks the cables of defendant company have been cut, damaged, or destroyed at the points hereinafter set forth, and that by reason thereof telephones of defendant company, which are instrumentalities used and useful in inter-state commerce, have been rendered inoperative and that complainants, being directly interested in certain of said cables and telephones, and appearing herein on behalf of all persons interested, are entitled to have said cables immediately repaired and to have service thereon immediately re-established. * * * It is therefore ordered, adjudged and decreed that the defendant company shall immediately repair all its cables located at or near the following places (here follows a description of points where repairs are imperatively needed as alleged in the complaint) * * *.

It is further ordered, adjudged and decreed that the defendant company shall immediately repair all other cables, lines, wires, appliances and facilities of the defendant and that it shall keep and maintain all said property in a good state of repair and in condition for operation."

Other parts of the order are either injunctional or findings of facts. The order itself is sufficient answer to all of counsel's argument. Such an order would be clearly within the power of a court in mandamus proceedings, and if it could be issued at law, in a case of this kind where mandamus, by reason of procedure and because of continuing conditions, is a cumbersome and inadequate remedy, it could be granted by a court of chancery.

It is contended that although this suit was instituted by patrons of the company against the company only, it is squarely within Section 20 of the Clayton Act which enacts certain limitations upon the power of federal courts "in any case between an employer and employes, or between employers and employes, or between persons employed and persons seeking employment" involving a labor controversey. This contention will occupy here none of the court's time. It is at present of no consequence to consider whether this Section 20 should be construed to govern cases not within the exact terms of its limitations. If this portion of the Act presents the novel features claimed for it, it may well be argued that it is therefore class legislation which, if valid at all, must be construed narrowly, but respondent's motion to the information against him may be disposed of to a better purpose if we assume, with his counsel, that the Clayton Act applies in every section to this controversy, it being understood, of course, that the court is not deciding the point, but joins with counsel in the assumption because, if Section 20 of the Act does not apply, respondent's case is hopeless.

The fact that Local 245 of the International Brotherhood of Electrical Workers was permitted to intervene through the representations of Hoffman must not be taken as indicative that the court finds the case to be under Section 20. The question still remains whether the issue that now appears between the complainants and the Union is under the Clayton Act.

Without extended comment, we hold that an "irreparable injury * * * to a property right of the party making the application, for which there is no adequate remedy at law," is involved in this case, to prevent and abate which the action is brought. As clearly we must hold also that that is described "with particularity in the application." Argument to the contrary seems to us to be mere effusive verbality.

The second paragraph of Section 20 we quote in full as the important one. It has sometimes been called "labor's bill of rights." We may as well call it an "employer's bill of rights," and, also, when there is a labor controversy involving a public utility as here, the "public's bill of rights." The "rights" guaranteed by it to the employes, "in any case between employer and employes," are to be set up against and limited by the certain "rights" of the employer therein written. He has just as much right, under this section, that his employes shall not exceed the limits of their rights under it, as they have to enjoy them. The rights of the employer begin where those of the employes stop. The granting of a "right" by statute always involves an obligation upon the favored one not to exceed its limitations. The Act says:

"And no such restraining order or injunction shall prohibit any person or persons, whether singly or in concert, from terminating any relation of employment, or from ceasing to perform any work or labor, or from recommending, advising, or persuading others by *peaceful* means so to do; or from attending at any place where any such person or persons may *lawfully* be, for the purpose of *peacefully* obtaining or communicating information, or from *peacefully* persuading any person to work or to abstain from working; or from ceasing to patronize or to employ any party to such dispute, or from recommending, advising, or persuading others by *peaceful* and *lawful* means so to do; or from paying or giving to, or withholding from, any person engaged in such dispute, any strike benefits or other moneys or things of value; or from peacefully assembling in a *lawful* manner, and for *lawful* purposes; or from doing any act or thing which might *lawfully* be done in the absence of such dispute by any party thereto; nor shall any of the acts specified in this paragraph be considered or held to be violations of any law of the United States."

It is well to note, and not to lose sight of, the fact that the words "lawfully," "peacefully," "lawful," "peaceful," dominate the thought of the second paragraph of the section in question; they control its meaning as they control both the court and the parties to a labor controversy. The statute but enacts the position which courts have universally taken; there is nothing new in it, for we hold that no case exists where a court has attempted jurisdiction to control lawful and peaceable action by injunction, although it may seem that sometimes judgment may have been faulty as to what particular action was "unlawful" or provocative of a disturbed peace.

The challenge to the court is to define "peaceful picketing" within the limits of this section. This does not seem to be an occasion for an attempt at an academic formula which, in any detail, would meet all exigencies possible in labor controversies, if one could be drawn up. Each case presents its own peculiar questions. An act may be lawful and peaceful, or just the opposite, according to its setting. It is easier, and far more practicable, therefore, to deal in prohibitions than in affirmations.

Broad generalizations, however, are easily framed, because, if we just keep in mind the prevalence in the statute of the qualifying idea of "peaceful" and "lawful" action, we cannot be misled. The best we have seen in one lately appearing in a newspaper devoted to labor interests. It is: *"What constitutes peaceful picketing may be answered by any fair-minded man if this question is asked, 'Would this be lawful if no strike existed?'"*

We accept this as a very good test, and apply it to the concrete questions of fact arising in this case, as propounded in the several informations, with conclusions certain to come to every "fair-minded man." Suppose no strike were in progress—

Would it be lawful for one or more men to use offensive, abusive, insulting or threatening language to another or others; for one to call another a "rat," a "scab," a "thief," and "outcast," or by any other name commonly accepted as offensive, or degrading, or calculated to provoke the other to break the peace in resentment?

Would it be lawful for one man, or more, to take station adjacent to the place of rest, lodging or work of another, or others, and there, by gesture, language or otherwise convey to the other insult or threat?

Would it be lawful for one or more men to force his or their talk upon the unwilling ear of another; to compel him to listen against his will?

Would it be lawful for one man or more to persistently follow another to and from his work, to his home or lodging, and about the city, forcing upon him unwillingly their presence, without occasion other than to unmistakably suggest to him their hostility unless he meets their views?

Would it be lawful for one to photograph another against his will, especially under circumstances which indicate unfriendliness to be the spirit, and a hostile use of the photograph to be the object?

Would it be lawful to slink upon an unsuspecting man, inoffensively gazing into a shop window, and deal him a blow; to step from the hiding of an alley to trip a lady, and then to strike her escort as he stoops to her assistance?

These questions are formulated upon the testimony produced in open court, because of which attachments were issued under the law, resulting in the filing of informations against which counsel for respondents has presented the motions we are concidering. This court has heard other testimony upon which as yet no writs have issued. Upon the facts therein alleged and upon alleged occurrences which have been the subject of comment in the public press since the middle of November as part of local contemporaneous history, we may ask certain other questions and thus touch all the phases of disorder which have marked the city of Toledo in the time mentioned and which there is apparent justification in assuming were incidents of the strike. If no strike were in progress—

Would it be lawful to intercept a young girl on her way to work and beat and scratch her and tear her clothing; to destroy the telephone connections with public hospitals, so as to leave them without means of communication; to destroy fire department lines, hazarding the safety of property; to so menace, threaten and frighten the employes of another, as to make it necessary to convey them to and from their work in armored or protected cars; to so act as to gather large crowds of bystanders and curiosity seekers about places of business to the interruption thereof; for a crowd of a dozen or more men to surround a vehicle, follow it through the business streets of a city, shouting offensive names, stopping or interfering with traffic; to cut automobile tires; to strew tacks in streets for the purpose of destroying tires; to throw bricks and stones at automobiles; to assault and beat a boy engaged in delivering water to a place of business; to assault persons entering one of the prominent hotels of the city, or to follow such persons from their place of employment to said hotel, calling them offensive names and causing crowds to gather?

Of course the court is not assuming that these things are established facts, or that the commission of any of them should be charged to any parties now before the court, although the public prints, without any denial, ascribed some of these transactions to the activity of strikers on picket duty, who are parties to this cause. We are calling attention to them only because they are incidents not uncommon in labor controversies, and, as such occurrences were not noticeable incidents of the city's history prior to November, 1916, except in cases of other strikes, and, as it is not understood that the defendant company was having such experiences before that date, it is not unnatural to assume that they were induced, those that really occurred, in some manner by the labor controversy which caused this suit. Because such occurrences are liable to be the result of passions inflamed by such controversies, there is an insistent and undeniable demand that all persons having part in a strike, who are trying to exercise their rights under the law to maintain a strike, should be persistent in their efforts to keep the controversy within lawful bounds and to guard that these inexcusable results do not follow; otherwise, in the estimate of the public generally, they will be held to some considerable measure of responsibility.

"Any fair-minded man" will answer each of these questions above stated in the negative. It must be borne in mind that not every act is lawful against which no positive provision of law exists. Many acts are unlawful for which no affirmative penalty is enacted, or against which no redress at law is possible, and some, while within the prohibitions of positive law, may not offer a practicable occasion for redress at law, yet a court of equity may be asked to protect the intended sufferer from the annoyance and damage they may create, and such a court may enforce its prohibitions—no legislation yet exists to the contrary, if legislation depriving courts of such power is possible. Some acts, lawful when but once performed, may become unlawful when repeated for the purpose of annoyance or damage and may be restrained when that purpose becomes plain.

The right of free speech does not give any one the privilege to force his views upon others, to compel others to listen. The right of the others to listen or to decline to listen is as sacred as that of free speech. It is clear that if one does not desire speech of another he may as surely have his privacy therefrom as the privacy of his home.

It is undeniable that the so-called right of peaceful persuasion may be lawfully exercised only upon those who are willing to listen to the persuasive arguments.

Again, every man has the right to the pursuit of his lawful business or employment undisturbed, and any act performed with intent to disturb the full and unrestrained exercise of his faculties and wishes in such employment is plainly unlawful.

Again, he has the right of privacy and freedom from molestation of private persons, hostile or otherwise, at his home, at his lodging, at his place of work; he has the right to walk the streets without annoyance from the unwelcome attentions of others, so long as he is conducting himself in a lawful manner.

Again, the right of one to the privacy of his own features to the end that he may not be photographed without his consent is manifest. It has been sustained by the courts in actions for damages.

Again, the right of one man to work is as much entitled to respect as the right of another to cease work or to strike.

Again, the right of an employer to engage whomsoever he chooses is as strong as the right of an employe to refuse to work.

Again, the right of an employer to have access to and from his place of business, and his right to have the streets and public highways in front of his place of business kept clear of crowds, bystanders and curiosity seekers, is as strong as the right to picket, and no picketing which is conducted in a manner to attract and retain the presence of crowds can be said to be peaceful, or within the law.

It is a safe and proper generalization that any action having in it the element of intimidation or coercion, or abuse, physical or verbal, or of invasion of rights of privacy when not performed under sanctions of law by those lawfully empowered to enforce the law, is unlawful; every act, of speech, of gesture or of conduct, which "any fair-minded man" may reasonably judge to be intended to convey insult, threat or annoyance to another, or to work assault or abuse upon him, is unlawful.

Not a syllable of the Clayton Act, or of any other law, whether of legislation of Congress or of the common law, sanctions any of the incidents we have referred to. They are to be condemned as legally inexcusable—such must be the verdict of "any fair-minded man"—nothing can be said in justification.

These propositions are so elemental that, but for the confusion which exists in many minds that a labor controversy affects the commonest rules of life, it would seem a waste of time to state them. The existence of a strike does not make that lawful which would otherwise be unlawful.

These personal rights to which we have alluded are, in each instance, precisely those which the striker himself would insist upon were conditions reversed.

They are also so plain, and the answers to the questions involving them so certain, that one called upon to enforce the law, if he has but ordinary intelligence, will plainly fail to do his duty when in his presence a fellow-citizen suffers an invasion of his rights of this character.

The things we have mentioned are so clearly unlawful that the failure or refusal of public officials to prevent their occurrence or to punish their commission, presents a plain and reprehensible evasion of official duty. Any officer of the law, a policeman, for example, ought to know that such acts are in violation of law and of individual rights, subjecting their perpetrators to restraint and to punishment; he must know that a sworn duty devolves upon him to arrest the guilty party, and that such an arrest would be, in no respect, an invasion of any right arising from a strike or the right of peaceful picketing. Having a mind capable of understanding the question, "Would this be lawful if no strike existed," he could have no difficulty in seeing his duty to prevent such occurrences. If the court may accept as reasonably accurate the testimony it has heard, and if we may accept as fairly reliable the history of Toledo as it was detailed in the newspapers in the months of November and December, wherever the responsibility therefor may be placed, no "fair-minded man," in our judgment, can say that the plain rights of individuals and the right of the public to order were in all possible cases observed and preserved to the degree which law and official obligation demanded.

The labor organization, party to this case through the representation of Hoffman, came here voluntarily and was admitted upon its application and the statement of its counsel, in the presence of the officers of the organization, that the injunction then in force would be observed and respected until it should be modified or vacated by this court. Indeed we have, as we have observed, exactly the injunction which the labor defendants in this court agreed should be issued. Yet it pleads that it intends to "interfere" by all "lawful means" with the business of the defendant company. It should know and act upon the knowledge that the only "interference" which the law permits is that incidental to a strict observance of the terms of Section 20 of the Clayton Act. If it goes beyond the privileges of action therein provided, it comes within the court's restraining and punitive processes. Its only safe course, in pursuing its "interference" methods is to place intelligently and carefully, in word and conduct, the same emphasis which Congress employed on the expressions "lawful," and "lawfully," "peaceful," and "peacefully," as used in the Act.

The Ohio State Telephone Company is a public utility. Its first duty is to serve the public. Its work meets a vital necessity. The right of its striking employes to "interfere by lawful means" with its business does not mean a right to cripple performance by it of its duties to the public, if it can find people willing to work for it. If labor can be had, the company must employ, and the strikers must permit it to employ and use labor to perform its public duties, and anyone willing to work for it must be allowed by everybody entire freedom to do so. The public, having a great need for services of the character offered by this public utility, has an enforceable right to demand these conditions of both the company and of those associated in controversy with it. This court is empowered to say to the company that it must meet its public obligations. Coupled with that power of the court is the power and duty of laying its prohibitive and punishing hand upon any one whose willfully unlawful conduct tends to render abortive the exercise of that power. We can no more say to the company that it must yield to the demands of its striking employes than we can say to them that they must meet the company's actions. The controversy must be carried on, on both sides, without substantial detriment to the company's public service.

"Peaceful picketing" is exercisable only within these limitations; no "interference" with the company's business is lawful which exceeds them.

Whatever may be the effect of the provision of the Clayton Act now under consideration upon controversies engaging corporations not public utilities and their employes, we cannot believe that Congress enacted against the public welfare to sanction more than we have above indicated.

Two maxims, which have much the same meaning, are universally treated as controlling all legislation and as limiting all personal rights. They are: *Salus populi est suprema lex*, and *Salus reipublicae suprema lex*. Liberally translated they mean that the public welfare is the first and supreme consideration. They are the law of all courts and all countries. Individual rights universally are, and plainly must be, subordinated to the public good, and of this principle we have many applications, of which the superior quality of the public's interest in the service of a public utility vitally conserving the public welfare is one. Congress must be considered to have legislated in the light of this principle, which must be resorted to as one essential criterion of interpretation of the acts of all legislatures.

Holding, as we must, that the public interest in the company's public service is the first consideration, that it is paramount to that interest in the company's affairs held by the very small fraction of the public which would work for the company, and to that enjoyed by that other very small fraction whose members hope for a return from their investments, we are unable to agree with respondent's counsel that the order is deficient because it does not conform to the provision of Section 19 of the Clayton Act that an injunction order should specify in "reasonable detail" the things enjoined.

That portion most vigorously attacked as too broad and indefinite is the provision restraining the doing of "any acts or things which may interfere in any respect with the performance of the duties and obligations of the defendant company as a common carrier."

This provision is as definite as it is possible to make it. It is this paramount interest in the public which may not suffer impossible to set out every act or line of conduct which might work interference. Labor controversies are not unexpected or unusual; courts recognize that they are possible; courts also notice that the existence of one produces some embarrassment to the employer affected in the management of his business. Whether that embarrassment arises to a state of "interference," as that term means in cases of this sort, depends upon how the controversy is conducted on either or both sides. A total cessation of the employer's business, even if that of a public utility, might not indicate an illegal interference under some circumstances. A strike *lawfully* conducted is not an illegal interference, although it might effect, even, a total paralysis of a public utility's activities, resulting in great public suffering and loss. The right to abandon employment, by individuals singly or in association, is unquestioned, and the law maintains the right of such late employes, commonly known as strikers, to "peacefully" persuads others to abandon the same employment, or to refrain from engaging in employment, and to that end "peaceful picketing" is permitted for purposes of observation and in formation and "peaceful persuasion." But no single act, to which we have alluded above, can be possibly considered to be a necessary and hence an excusable accompaniment of peaceful picketing. Such acts tend inevitably to that "interference" which the law condemns.

In a recent decision, *The Tri-City Central Trades Council*

vs. American Steel Foundries, (October session 1916, 7th Circuit Court of Appeals) which the public prints treated as one favorable to organized labor, this language occurs:

"Plaintiff's contention that a court may restrain lawful acts of striking employes when committing and carrying out the purpose of an unlawful conspiracy to destroy the employer's business is supported by many authorities citing 156 Fed. 450; 158 U. S. 564; 232 Ill. 424; 165 Ind. 421). * * * If the purposes of the undertaking complained of were purely and simply or even primarily, interference with the plaintiff in the conduct of his business as alleged, no act, however innocent in itself, directed to that end, can be said to have a lawful purpose for its doing."

We cite and quote this case not because it presents a novel doctrine, but simply because it is the latest on the subject. It is a legal proposition, too firmly settled to be disregarded, that two or more persons may not combine to employ activities, in which singly they might lawfully engage, with an intent that the effect of their joint action should be the injury of another, and there is absolutely nothing in any provision of the Clayton Act, and we have in mind particularly Sections 6 and 20, that weakens the force of this principle. The case we cite is decided with reference to the Clayton Act. In this view, we suggest that the bald statement in the pleading of the labor organization referred to that its purpose is to "interfere" by lawful means with the business of this public utility comes perilously near a confession that an unlawful conspiracy is in progress and the only way that such a conclusion can be avoided is a line of conduct during the further continuance of this strike which will secure the public against that interference with the business of this public utility which is the direct result of the unlawful acs of the character of those to which we have alluded. Accompanying the strike have been occasions of undobtedly unlawful interference. If convictions should follow the charges now before the court, involving members of Local 245 when on "picket" duty, the attitude of the union as a law-abiding organization would be prejudiced very unfortunately, especially when it is considered that it formally urges to this court its purpose to "interfere" with the company's business. If its members will confine their strike activities within the limits of the Clayton Act, then whatever embarrassment ensues to the company will be no illegal interference.

The court's views as to what is and what is not peaceful picketing in the instant case is sustained by an unbroken current of authority. The early authorities are summed up in Labatt on Master and Servant, Vol. 7, page 8364. Our position is consistent with Judge Taylor's opinion in a local case, *Pope Motor Car Company vs. Keegan*, 150 *Fed.* 148. We cite but two additional cases, already referred to in this opinion, because they are the latest cases and deal with conditions since the Clayton Act was passed, namely; *Tri-City Central Trades Council vs. American Steel Foundries, supra*, and *Alaska S. S. Co., vs. International Longshoremen's Ass'n of Puget Sound et al., supra*. The concluding paragraph of Judge Neterer's able opinion in the last case cited we regard as specially worthy of the attention of the labor defendants in this case. (We quote 236 *Fed.* 972):

"While there is no testimony that any of these acts were expressly authorized, there is no evidence that the acts were disapproved, or members disciplined or expelled. The testimony does not show the the defendants did have control of the situation, and did not exercise their influence or power to correct the irregularities or disavow the acts until the issuance of the temporary restraining order and service upon the defendants, when all overt acts ceased, which considered with what defendants did do, confirms the conclusion that the acts were under the authority and within the control of defendants. When persons or parties set in motion machinery for the purpose of shaping sentiment, they cannot take the benefits, without also being burdened with responsibilities. Such parties thereby assume the burden of controlling such agency, if within their power; and if, perchance, some persons unauthorized, acting with defendants, commit unauthorized acts, it is incumbent upon the defendants to show such fact, and, if committed by members under the control of the association, to disavow such acts by causing such offending members to be disciplined or expelled."

A history of this controversy shows that immediately after the issuing of the court's temporary restraining order, the most flagrant public manifestations of unlawful conduct ceased; that thereafter those things were done which could be done surreptitiously or with a smaller chance of detection, although one or more of the informations follow attachments after testimony involving several members of the union and consequently parties to the injunction in what appears to have been an indecent public disorder which was permitted by a local peace officer, who was present, to proceed with no attempt at repression.

The informations in question are all lodged against members of the union. If the charges are sustained on trial, it would appear that they have violated the beneficent provisions of the Act which their counsel claims gives them special consideration. It would seem, therefore, that more time, for the honor of the defendant local union, might be profitably spent in getting at the facts, the truth of the charges, and less to technical objections which have nothing to do with the merits.

If the court finds the several charges sustained by the testimony; if the acts, wilfully performed, bear with reasonable certainty the construction that they were performed wih coercive, intimidating, insulting or annoying intent, that thereby the lawful business of the company may suffer interference, the court's duty is plain to say that the acts are not privileged by any law and are violative of the order in this case to which Hoffman and his fellow-members consented. In such case, some more tangible and distinct proof is indicated to be necessary that the union honors the law its counsel invokes than mere disclaimer of responsibility. In such an event the unfortunate assertion in the pleading that Hoffman and his associates intend to "interfere" by means of what they call "peaceful" and "lawful" measures would create a demand for action more definite than even words of condemnation by Local 245 of its guilty men. Judge Neterer, in the opinion quoted, points out the way.

The law that is called upon to protect Hoffman and his fellow-members should be honored by it. The local and defendant union "set in motion machinery for the purpose of shaping sentiment"—and its responsibility is clear to control such agency within lawful bounds.

We make these observations, not to convey an impression that anyone under charge is guilty—no one has been tried and we may have no opinion yet—but moved by a profiund conviction that, because of the undeniable lawlessness which has accompanied the telephone strike and because of the condition of the record made so far in this case, an imperative demand exists now, for its own good, for affirmative action by Local 245 to range itself definitely on the side of law and order, if it would have that efficiency for social good of which organized labor is capable and which alone justifies its existence, and if it would have and retain public respect.

The Local should protect its members against unjust charges; its duty to itself and its membership is just as plain to set itself sternly against disorder. There is no legal excuse for disorder in a strike—somebody is always responsible in some degree to the law for disorder.

The motions to the several informations should be denied.

Southern Bell Advertises Liberty Bonds

The Southern Bell Telephone Company on Friday advised M. B. Wellborn, chairman of the federal reserve bank, of Atlanta, that the company's contracted advertising space in sixty daily newspapers published in twenty-six cities located within the territory covered by the feredal reserve bank, will be placed at the disposal of the bank for advertising the liberty loan bond issue from now until June 15, 1917, without cost to the bank.

Mr. Wellborn stated that this patriotic and generous offer will be accepted, and was very high in his praise of the patriotic spirit shown by the Southern Bell Telephone Company.

Companies of the Bell telephone system have subscribed for $5,000,000 worth of bonds of the government liberty loan issue.

Central Union Case Again

Arguments were commenced May 29 before Judge William E. Dever in the Superior Court in Chicago on the form of decree to be entered in the suit of the minority stockholders of the Central Union Telephone Company against the American Telephone and Telegraph Company. On January 21 Judge Dever rendered a decision that the control exercised by the American Telephone and Telegraph Company through the ownership of 95 per cent of the stock of the Central Union Telephone Company was illegal and against public policy.

Telephone Patents Issued Recently

A Brief Digest of those Current Specifications Most Interesting to Telephone Men

BY DAVID S. HULFISH

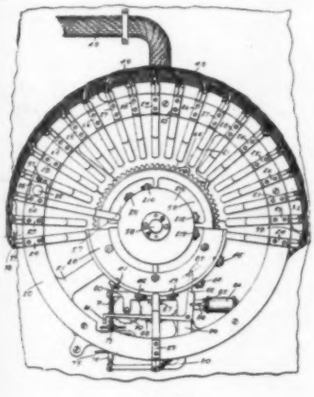
1,217,160. Linefinder System. Issued to B. G. Dunham, assignor to Western Electric Company, Inc., New York, N. Y. In a step-by-step line finder, for automatic telephone exchange, two testing relays are used, one to test whether the line is busy or idle and the other to test whether an idle line is calling or not calling. Together, the relays will select a calling line.

1,217,168. Linefinder System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. In an automatic switchboard, the line relay disconnects the cutoff relay and connects a stop relay instead. The automatic switch searches until the stop relay is found, the stop relay then operating to check the switch in engagement with the calling line.

1,217,241. Alarm Switch. Issued to O. H. Tracy, assignor to The Volunteer Fireman Signal Company, Minneapolis, Minn. An automatic switch is arranged with a number of lines, and when operated rings upon all of the lines and then connects all of the lines to a single master circuit so that alarm information may be given to all lines at once. When the switch is not operated, the lines are independent of each other.

1,217,255. Ringing System. Issued to C. S. Winston, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. In a manual switchboard cord pair, a key is provided for automatically ringnig the called line, but it is possible also to ring manually upon the line independently of the automatic ringing facility.

1,217,426. Coin Signal Circuit. Issued to J. Erickson, assignor to Automatic Electric Company, Chicago, Ill. The coin



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device buzzes to indicate the denomination of coin deposited; the circuit for operating the buzzer includes the line conductors, and is adapted for common battery working.

1,217,472. Call-Distributing System. Issued to J. L. McQuarrie, assignor to Western Electric Company, New York, N. Y. (Application filed April 19, 1906.) A motor-driven linefinder connects a calling line directly to a cord pair upon a manual switchboard.

1,217,477. Supervisory System for Automatic Exchanges. Issued to T. G. Martin, assignor to Automatic Electric Company, Chicago, Ill. (Application filed January 3, 1910.) Each trunk has a lamp at a manual operator's switchboard, and the lamp glows when the selector of the trunk is operated and until the sideswitch of the selector reaches its final position, indicating the complete operation of the selector.

1,217,510. Linefinder System. Issued to M. Schwartz, assignor to Automatic Electric Company, Chicago, Ill. Where several groups of trunks are able to pick up the same calling line, the circuits are arranged that a call from the line will cause several master switches to operate in unison, thereby giving greater facility for locating and selecting the calling line in the minimum time.

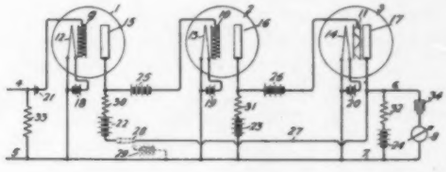
1,218,048. Automatic Selecting Switch. Issued to J. G. Blessing, assignor to Automaticc Electric Company, Chicago, Ill. (Application filed March 29, 1912.) In a switch of the general design of the Strowger selecting switch, the normal or idle position of the brushes is at the top, the first steps being made downward to find the desired level, and then around to the desired contact points.

1,218,182. Meter System for Automatic Exchange. Issued to D. S. Hulfish, assignor to Canadian Independent Telephone Company, Ltd., Toronto, Canada. (Application filed May 13, 1912.) Each automatic connecting device has a pilot switch, and the circuit for actuating the meter is closed by the pilot switch in a movement made at the time of answering of the called party; for "free service" lines a circuit is provided which will allow the "free service" telephone to answer any call without operating the meter of the calling line.

1,218,563. Automatic Recording System. Issued to M. L. Johnson, Chicago, Ill. At a telephone which is a receiver with a record card, and the central operator has the power to record upon the card of a called station the number of a calling station or other information.

1,218,650. Repeater System. Issued to R. V. L. Hartley, assignor to Western Electric Company, Inc., New York, N. Y. In a series of repeaters working in "cascade" formation, each amplifying a current and passing the amplified current to the next repeater to be further amplified, a back connection is provided so that a portion of the amplified current is passed back to a preceding repeater, thus multiplying the power of the set of instruments. The thermionic form of repeater or speech relay is shown.

1,218,804. Selective Ringing System. Issued to F. N. Reeves, assignor to Western Electric Company, Inc., New York,



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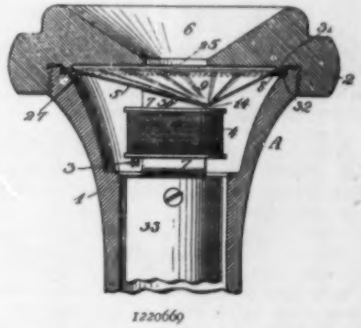

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N. Y. In selecting trunks in an automatic system which lead to final connectors which reach lines having selective stations upon them, the character of ringing current to be applied to the called line depends uoon the trunk selected; hence by selecting the proper trunk the proper station may be rung upon the party line.

1,218,805. Call-Distributing System. Issued to J. G. Roberts, assignor to Western Electric Company, Inc., New York, N. Y. Each call-receiving device upon a manual switchboard is provided with a number-recording apparatus; the call distributing switches when connecting a calling line to a call-receiving device also transmit to that device, and record there the directory number of the calling line connected.

1,219,587. Linefinder System. Issued to J. N. Reynolds, assignor to Western Electric Company, Inc., New York, N. Y. The cutoff relay is energized by a circuit passing through a winding of the line relay, so that when the line is the calling line of a connection both the line and cutoff relays are held charged throughout the conversation. When the line is called, the cutoff relay is charged without charging the line relay.

1,219,656. Supervisory System. Issued to T. G. Martin, assignor to Automatic Electric Company, Chicago, Ill. Where a manual operator calls through automatic switches to obtain a desired telephone line, audible busy tone is given and visual signals are given to the operator back through the automatic switches.

1,219,700. Automatic Selecting Switch. Issued to A. M. Bullard (deceased), assignor to Western Electric Company, Inc., New York, N. Y. (Application filed July 19, 1906.) In a single switch having telephone lines connected to its contact tags,

several pairs of contact arms are arranged, each pair of arms connecting with a line to connect the two lines together, the several pairs of arms all operating upon the same line tags. In each pair a constantly moving search may be set up to search for a calling line.

1,219,727. Compensated Repeater System. Issued to Elwood Grissinger, assignor to American Telephone and Telegraph Company, New York, N. Y. In a two-way repeater system having an armature with a mechanical period, the apparatus is ararnged so that the mechanical phase displacement in the repeater or speech-relay device will be manifested in the direction to balance or to compensate for electrical phase displacement elsewhere in the system.

1,220,228. Linefinder System. Issued to D. S. Hulfish, assignor to Canadan Indepiendent Telephone Company, Ltd., Toronto, Canada. In a linefinder system, when two lines are calling at the same time, a controlling circuit or interference circuit determines which of the two shall be engaged first by the connective devices of the automatic switchboard. An adaptation for the Lorimer system of machine switching.

1,220,607. Testing Switch. Issued to H. P. Clausen, assignor to Western Electric Company, Inc., New York, N. Y. Telephone lines are carried to a testing switch which tests them one after another, switching them one at a time to a set of testing relays which sounds an alarm if any line is found upon which the electrical conditions are not in accordance with some predetermined standard of test.

1,220,669. Diaphragm. Issued to Frank E. Miller, New York, N. Y. A receiver diaphragm is dished, conically, with the ponit of the cone toward the receiver magnet and eccentric from the receiver magnet's axis.

Public Utility Commission News

Reports Concerning the Activities of State Regulating Bodies in the Telephone Field

IN ITS findings in the matter of the valuation of the Chesapeake and Potomac Telephone Company, the Public Utilities Commission of the District of Columbia summarizes as follows:

1. Because of the destruction of practically all the records of the company in the Baltimore fire in 1904 it has been impossible to ascertain the cost of the property prior to that time and no historical cost, therefore, has been found.
2. Cost of reproduction of physical property within the District of Columbia used and useful for telephone operations $6,856,494.00
3. Paving included above but not owned and not paid for by the company and therefore to be considered as deducted in connection with fair value 92,470.00
4. Accrued depreciation as calculated with respect to reproduction cost 946,684.00
   The commission believes that the above amounts for accrued depreciation might be proper for deduction in case of a finding of value for purchase, but not in full in a valuation as a basis for rates. The commission finds that considerably lesser amounts should be deducted in this case.
5. *Intangibles and cost of development.*—The commission finds that some allowance should be made for some such additional elements of value, but that the amounts should be very much less than as claimed by the company.
6. Net additions to property, July 1, 1914, to Dec 31, 1916, inclusive 383,932.48

In determining the fair value of the property of the respondent company as provided for in paragraph 7 of the act creating the Public Utilities Commission the commission has carefully studied all the testimony adduced in the hearings in this case and the argument of counsel, and the action of other commissions and of courts in similar cases has been carefully considered.

After full consideration of all the testimony and evidence in this case, the commission finds the fair value of the Chesapeake & Potomac Telephone Company used and useful for the convenience of the public within the District of Columbia as of July 1, 1914, to be $6,400,000.

As hereinbefore set forth, the commission finds the net additions to investment in respondent company's property from July 1, 1914, to December 31, 1916, inclusive, to be $383,932.48, and therefore further finds the fair value of the property used and useful for the convenience of the public within the District of Columbia as of December 31, 1916, to be $6,783,932.48.

In reaching the above conclusions the commission has as to every element of value, considered the company as a going concern in successful operation.

RATES OF DEPRECIATION.

Paragraph 16 of the act requires that "the commission shall ascertain and determine what are the proper and adequate rates of depreciation of the several classes of property of each public utility. These rates shall be such as will provide the amounts required over and above the expense of maintenance to keep such property in a state of efficiency corresponding to the progress of the industry."

The following table shows annual depreciation rates with respect to each Interstate Commerce Commission classification of property of the respondent company as derived by the commission's engineers on the straight-line basis:

Annual depreciation rates.

	Per cent of reproduction cost
Buildings	1.17
Central office telephone equipment	4.12
Other equipment of central offices	4.12
Station apparatus	6.00
Station installations	6.66
Interior block wires	8.10
Private branch exchanges	5.66
Booths and special fittings	10.00
Poles and fixtures	6.67
Aerial cable	3.55
Aerial wire, exchange	7.93
Aerial wire, toll	1.48
Underground conduit	1.18
Underground cable	2.40
House cable	2.80

The following rates of depreciation are comparable with those allowed by this commission in other valuations for similar items of property:

Annual depreciation rates.

	Per cent of reproduction cost.
Submarine cable	2.40
Office furniture and fixtures	5.00
General store equipment	5.00
Teams	10.00
Motor vehicles	20.00
General tools and implements	33.33

After careful consideration of this subject, the commission finds that the rates to be tentatively adopted in this case shall be the straight-line rates as embodied in Tables 7 and 8 above, but that after further study of the company's experience as shown by its records, these rates at a later rate may be somewhat modified so as to lie between straight-line and 4 per cent sinking-fund rates, in reality constituting two portions, one according to the straight-line basis and the other the sinking-fund basis. The first to correspond with such renewals of expiring property as occur fairly uniformly yearly; the second applying to the creation of a reserve for future renewals which, because occurring at infrequent intervals and in amounts materially greater than the moneys annually collected for that depreciation, require the creation of a reserve therefor.

California

The city of Burlingame was denied a rehearing of its complaint against the Pacific Telephone and Telegraph Company by the Railroad Commission. The decision says that Burlingame is mistaken as to the commission's holding on the question of the city fixing telephone rates, and that if Burlingame had the power to establish rates for telephone service in certain cases prior to the amendment of the state constitution in 1914 and the re-enactment of the public utilities act in 1915, it did not lawfully exercise

this power because the resolution adopted by Burlingame fixing rates provided for a local exchange telephone service rate, including messages between patrons in Burlingame, San Mateo and other points, and no effort was made to provide a rate solely withtin the Burlingame limits.

Georgia

Gainesville, Georgia, is to have a new and exclusive telephone building and a new common battery, central energy telephone system, made possible by the Railroad Commission of Georgia when it approved the petition of the company to revise its rates on condition that the aforesaid improvements be made, said rates not to be effective until the improvements are completed.

It is understood that the telephone company will begin at once the installation of the new system, and it is believed that it will be completed in from sixteen to eighteen months. The building is to be erected at an expense approximating $13,000, while the new system, and equipment will cost around $40,000. The contract calls for placing underground all overhead cables and wires on the public square.

An increase in the rates of business telephones from $3 to $4 per month, and residence telephones from $2 to $2.50 per month, was allowed by the commission, as well as a reduction of extension business telephones from $1.50 to $1 per month, and residence extensions from $1 to 50 cents per month.

Idaho

On May 15, 1917, James Denning and S. K. Clark, doing business under the firm name of Denning & Clark, with their principal place of business at Dubois, Fremont county, Idaho, applied to the commission for a certificate of public convenience and necessity, authorizing them and their assignees to construct, maintain and operate telephone lines and a telephone system in Dubois, Idaho, and in the surrounding territory.

The commission finds that it would be for the best interests of the village and territory and inhabitants to require the applicants to commence construction of their proposed telephone system and lines within sixty days from the date of the certificate and order granted, and to limit the time within which the applicants shall be prepared to serve the village and territory with telephone service to a period of two years from the date of the certificate and order—(May 18):

It is hereby certified that the present and future public convenience and necessity require and will require James Denning and S. K. Clark, doing business under the firm name of Denning & Clark and their assignees, to construct, own, operate and maintain a telephone system and telephone lines in the Village of Dubois, Idaho, and the surrounding territory described as follows: Commencing at the Village of Dubois, running thence south in a westerly direction to the lines in the Birch Creek Canyon; also commencing at a point in the Village of Dubois running thence in a westerly and northerly direction to Medicine Lodge; commencing also at a point in the Village of Dubois, and running thence in an easterly and northerly direction to the valley known as Camas Meadows; also commencing at a point in Dubois and running thence south to a point about eighteen miles from the said Village of Dubois, for the purpose of furnishing said Village of Dubois and the suurounding territory, and the inhabitants thereof, telephone service;

It is therefore ordered that said James Denning and S. K. Clark, doing business under the firm name of Denning & Clark, and their assignees, be and they hereby are granted permission to construct, own, operate and maintain such telephone system for the purposes hereinbefore set forth, and that applicants commence construction of such telephone system and lines within sixty days from the date of this certificate and order, and in event applicants shall not be prepared to serve said Village of Dubois and its inhabitants, and the inhabitants of the surrounding territory with telephone service within two years from the date of this certificate and order, then in that event this certificate and order shall be and become null and void.

John W. Graham and A. L. Freehafer, public utilities commissioners, conducted an informal hearing in Lewiston, Idaho, in the matter of complaints against the Pacific States Telephone and Telegraph Company.

Complaints made were as to the charge of $5 required as a deposit before the installation of a telephone, which, unless the telephone is retained for a year, is forfeited to the company. Another complaint was relative to an alleged raise in rates of telephones used by lodges.

The fact was disclosed that the company operating from the Lewiston exchange all telephones in both Lewiston and Clarkston, is demanding the $5 deposit on the Idaho side and on the Washington side is neither demanding the deposit nor making any installation charge, which, it is said, would indicate a violation of the rules promulgated by the Washington commission.

Counsel for the company expressed a willingness to discard the deposit system provided the Idaho commission would adopt the system of rules of the Washington commission or other method of covering installation charges. In regard to the change in rates in lodge rooms the company admitted that no permission has been secured from the commission to raise these rates, but argued that no raise had been made, but that the rate had always meen $3 a month for such telephones and as a matter of concession it had given a 50 per cent rebate to lodges. Commissioner Graham suggested that taking either horn of the dilemma a violation of law had occurred.

Relative to the discrimination in not making an installation charge in Clarkston the company explained that by reason of Clarkston being looked upon as a part of the Lewiston office the matter had escaped attention. The commission continued the informal hearing until time is had to study and compare the Washington rules and regulations with those of Idaho, the company expressing an entire willingness to go under a system of regulation in Idaho as in Washington. The city attorney will be permitted to file suggestions and the commission reserved the right to call the parties before it in Boise.

Illinois

Officers of the Plymouth Mutual Telephone Company of Plymouth claim that the ruling of the state utilities commission has been in their favor in the fight with the Farmers' Switchboard Company.

The farmers' lines pulled off from the original Mutual Telephone Company, and for some months past have been operating a separate switchboard in Plymouth. Each system has been seeking the right to do business in the town and country and the case has been before the state commission for some time.

R. L. Cloud, secretary of the Plymouth Mutual Telephone Company, has received an official notice from the secretary of the state utilities commission declaring that the Plymouth Farmers' Switchboard Company has not complied with the law in securing a certificate of convenience and necessity and ordering the farmers' company to cease doing business in the village of Plymouth and vicinity until it obtains such a certificate.

The city of Dixon will formally protest the increase in telephone rates by the Home Telephone Company, sanctioned by the state utilities commission. Complaint will be made that the new rates are exorbitant.

Kansas

Six telephone companies operating in Overbrook and surrounding Kansas towns and using the same exchanges many times a day, will have until the middle of July to think it over before the Kansas public utilities commission hands down a decision on the application of one for action against the others. When the case was heard it developed that the questions were largely those of reciprocal arrangements—a matter of give and take free of charge. The commission gave some informal advice and took the case under advisement.

The application to determine the rights and duties of the six companies and the permission of one to sever relations with the others, if matters could not be satisfactorily adjusted, was filed February 21 by the Overbrook Commercial Wire Company. Defendants were the Carbondale Telephone Company, Wakarusa Telephone Company, Richland Telephone Company, Worden Telephone Company and the Centropolis Telephone Company.

Missouri

In the matter of the complaint of the Farmers' Telephone Company of Harrison County versus the Saline Mutual Telephone Company, the Public Service Commission of Missouri held that a telephone company whose capital stock consists of equipment, etc., whose members may severally own their lines and instruments, and pay into the treasury of the company the cost of the telephone and other expenses, whose officers receive no salary, and whose stock pays no dividends—the cost of operation and maintenance being paid by assessments upon the members—and which makes no charges for service rendered non-subscribers, need not secure a certificate of public convenience and necessity for the construction, operation and maintenance of its system, as it it not engaged in the conduct of the business of affording telephonic communication for hire and is not subject to the jurisdiction of the commission.

The complaint was dismissed.

A public hearing on the question of allowing an increase in rates for both business and residence telephones by the Southwestern Bell Company in Springfield, Mo., will be held at the Colonial Hotel July 11 by the Public Service Commission. Fred Moon will represent the city at the hearing, giving reasons why the increase should not be granted. J. W. Gleed of Kansas City will represent the telephone company. The announced purpose of the hearing is to determine the reasonableness of the present rates charged telephone patrons and to fix new maximum rates, if they are to be allowed. The company asked for an increase in rates last December.

Engineers and appraisers of the commission will take an inventory of all the physical property between now and the time set for the hearing. The company will turn over its books and records to them and give whatever assistance and co-operation that is possible.

Ohio

Patrons of the Clinton Telephone Company are being advised by circular letters from the company of a proposed schedule of rates which, if the public utilities commission approves, will become effective July 1, and the present free toll service to all the exchanges within the county will be omitted.

By the new schedule patrons will be charged ten cents for three-minute conversations between any of the company's exchanges. This will mean doing away with the present freedom of county service ad lib., as one might say, and placing the service through the various exchanges of the county on the same basis as other toll service.

The Lima Telephone and Telegraph Company has filed a suit in the supreme court to test the valuation placed upon its property by the state public utilities commission.

The company threatened this some weeks ago when the commission ruled that the rates upon business telephones were excessive, ordered them reduced and also ordered a proportionate rebate to cover a period of two years. The valuation to which the company objects comes through the consolidation of the two local companies something over two years ago.

The commission's valuation for rate making purposes was $1,004,340.04. The company contends that this is insufficient.

Pennsylvania

In the matter of John A. McSparran versus the Southern Telephone and Telegraph Company, alleging excessive and unjust charges for long distance telephone service between Lancaster, Quarryville and Hensel, all in Lancaster county, Pennsylvania, the Public Service Commission held:

Prior to October 1, 1915, charges for long distance service over respondent company's lines and its connecting line, the Bell Telephone Company, originating in respondent company's territory, were absorbed by respondent company in its regular yearly charges. October 1, 1915, respondent company and the Bell Telephone Company entered into a joint agreement as to long distance messages, the result of which was that respondent company no longer absorbed said long distance charges, but charged separately for long distance calls. No complaint is made as to the long distance rates themselves, but it is contended that respondent company cannot charge a yearly rate for service, and at the same time charge separately for long distance calls, but that the former should absorb the latter.

The Commission held that if prior to October 1, 1915, respondent did absorb its portion of the toll charges on calls originating in its territory on the theory that they were included in the annual telephone rentals paid by its patrons, still there is no legal obstacle to its right to terminate such agreement by its concurring in the establishment of the new rates and collecting its proper share thereof. That prior to October 1, 1915, respondent treated its entire territory, both as to local and long distance service originating in its territory as a unit, the annual rental including payment for both services. Since the change it has restricted its annual charge to local service within its territory, and all long distance service is to be paid for according to the new schedule from each exchange from which it originates. There is no discrimination in this new arrangement, as all patrons are treated alike. The annual rentals remain the same, but an additional charge is made for long distance service. The physical and financial condition of respondent company and the number of patrons on some of its lines fully justify the change whereby the revenues will be increased.

The complaint was dismissed.

Wisconsin

The Ashland Home Telephone Company and the Wisconsin Telephone Company will be obliged to establish physical connection at Ashland. This was the order issued May 11 by the Railroad Commission.

The application for connection has been pending for some time. The connection must be established on a rate basis. This is now in existence at La Crosse. In addition to the regular toll charge an extra charge for a call through one exchange to the other will be made. This will start at five cents for calls under fifty miles, ten cents for calls more than fifty and less than one hundred, and fifteen cents for all calls more than one hundred miles.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

Stromberg Gives Production Dinner

At the close of the day's work on Friday, April 20, seventy foremen, sub-foremen and department heads of the Stromberg-Carlson Telephone Manufacturing Company of Rochester, New York, motored to the Oak Hill Country Club, outside of the city, to do justice to the "Production Dinner" promised by Mr. McCanne last October and which was scheduled to take place when the production in any one month exceeded a certain amount. The figure set as a mark was exceeded during the month of March.

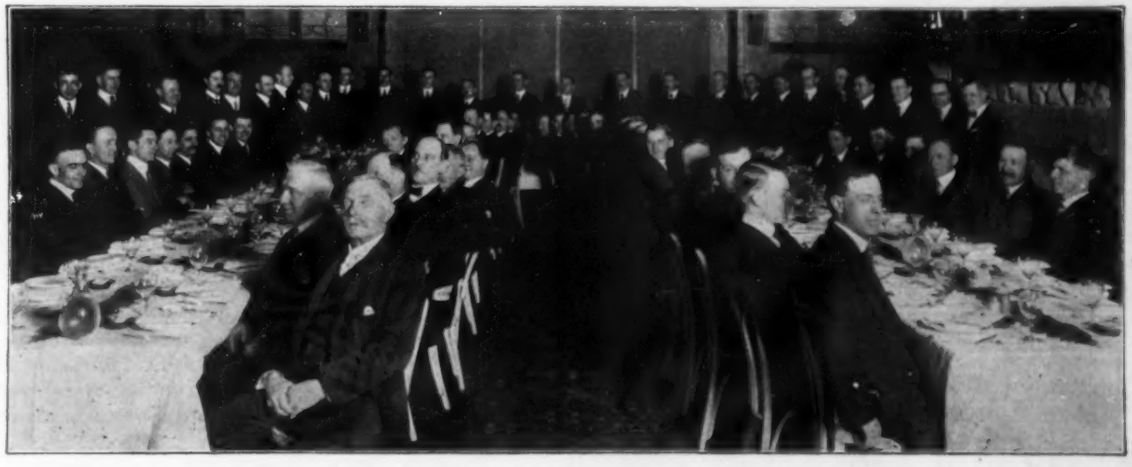
The accompanying illustration was made from a photograph taken of the group just before the dinner service began. The smiles on the faces grew wider and wider with each succeeding course and infected all with a contagious good fellowship. Patriotic and popular songs were sung during the meal and with vigor and harmony that rivalled the efforts of Rochester's far-famed community chorus.

A name contest was carried on between courses which gave each man an opportunity to become acquainted with his fellows. Beginning with the head of the table each man stood up for a moment so that the others could write his name on the contest blank. After all had stood up in turn the process was repeated but each man gave his name and department. As no one contestant had all names correct the prize—a box of cigars—was passed around.

By a coincidence the dinner happened to be held on the birthday of E. A. Hanover, purchasing agent of the company, and his friends took advantage of the occasion to present him with a number of useful and expressive tokens of their regard.

After the dinner a number of members of different branches of the office and factory organization gave impromptu speeches on subjects of an interesting nature ranging from Mr. McCanne's "My Friend Colonel Bogey" to Carl Grams' confession, "How I Kept Bachelors' Hall."

The party broke up about 10 p. m. and ended with an automobile ride along the River road to the city, which soon dispelled any tendency toward wakefulness.



Stromberg-Carlson Foremen's and Sub-Foremen's Production Dinner, April 20.

Copper

While the copper sold the government was not sufficient in amount to produce any effect on values, the fact that the price was half that of current quotations led to a false impression that the government was about to fix prices for all producers. This was erroneous, but it had a psychological effect in that it created a doubt that prevailing rates were justified on the basis of supply and demand. This led many purchasers of copper products, such as wires and cables, to hesitate about placing orders except for urgent needs. Most large consumers are well covered and could afford to hold off and await developments, which as a rule, they did. The absence of large sales to stimulate the market, and the increased receipts of metal due to better weather, a diminution of labor troubles and improvements in transportation, all operated towards producing lower prices, according to *The Wire Message*, published by Habirshaw Electric Cable Company and The Electric Cable Company.

There have been persistent rumors that the Entente Allies would again become heavy buyers, and that the United States Government would speedily require a much larger quantity of the metal than it had already contracted for. The latter rumor has apparently some foundation, as the *Journal of Commerce* of April 30 refers to *"The new price arrangements with the government whereby the Council of National Defence has agreed to a figure more in accord with outside market conditions."* The price is reported to be 26 cents—and the quantity upwards of 100,000,000 pounds. We have seen no official confirmation of these figures. It was further rumored that the government would require a liberal concession in price for the Entente Allies, as well as for itself.

It is certain that the 45,510,000 pounds recently purchased by our government represents but a fraction of its ultimate requirements, and that so soon as preparation for war is further advanced, much larger demands will be made on our copper producers.

It should also be borne in mind that delivery of the 448,000,000 pounds purchased by the Allies last autumn was to be completed by July first next, and was sup-

posed to represent their requirements for the first half of 1917. If this supposition is correct, the Allies must soon begin negotiations for their needs during the last half of this year, and there is no apparent reason why their needs should be less than for the first half.

Without some knowledge on which to base an estimate of what our government and its allies are going to require during the next six or eight months, and some positive knowledge of the terms on which sales will be made, a condition of uncertainty must prevail. Couple with this condition the facts that domestic consumption—though still large—has receded somewhat from the high peak of a few months ago, and that many big consumers are in a position to await developments, and we have ample explanation of the weakness which the copper market has shown during the past thirty days.

On fact should be clearly understood—though it does not seem to be: Whatever concession is made to our government and its allies, it concerns only the producers making the concession, and cannot be taken as indicating what the price of copper should be, based on the law of supply and demand. This law must ultimately prevail in fixing the price to the outside public.

We realize that the high point in the price of copper was due largely to heavy buying by consumers through fear that they would be unable to secure metal for their needs. Top notch prices during the past few months were more or less panic prices and recession from them was inevitable, but a permanent and substantial reduction in cost to the general public can only come when there is a substantial falling off in the world's requirements. It is difficult to see how this can take place while war is being waged on a vaster scale than ever, and no prospect of peace in the near future. The *Journal of Commerce* states the situation in this way: *"Statistically the position of copper is strong, with production well behind consuming demand."*

With so many uncertain factors to be considered, it is hazardous to prophesy what the price of copper is likely to be in the near future. We note in the *American Metal Market* the following comment by Walker: *"It is my opinion that there will be heavy buying soon for the third quarter, or the last half year delivery, and that the price agreed upon will be about 28 cents."* One thing is certain; if the report that the government has agreed to take 100,000,000 pounds of copper at 26 cents is correct, the price to the outside public will not be any lower than this.

Conservation of Battery Consumption

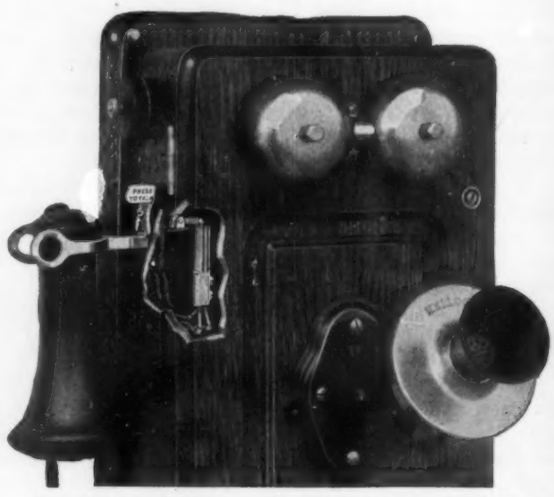
If a company's telephones are of the newest and most economical type, with respect to battery consumption, the loss from 20 listening telephones is not less than 8.4 watts, and as this energy comes from dry batteries, the loss is equivalent to burning about thirty 25-watt Mazda lamps on ten-cent current, not counting the cost of installing the batteries in the telephones.

Should any telephone manager discover even three 25-watt 110 volt lamps burning unnecessarily in broad daylight, he would not only turn them off before doing anything else, but would doubtless endeavor to locate the person responsible for such unnecessary waste, and cautin him to avoid its happening again.

At the same time, two "rubber necks" on one of his country lines would really be wasting more of the company's money, and ten parties receiving the market report on a connecting country line would be "burning" unnecessarily the equivalent of 15 of the lamps he was in such a hurry to turn off.

The fact is that three brilliantly burning lamps constitute a spectacular exhibition of waste, whereas the waste of current in the telephones, even though it be ten times as great, does not arouse one to drastic action for the mere reason that it is hidden.

The foregoing refers to the latest and most efficient transmitters, but it is not uncommon to find telephones fitted with older transmitters where the cost of the current waste, because of one receiver off the hook, exceeds that of burning three 25-watt lamps at ten cents per kilowatt hour.



Battery Saver Attached to New Type Compact Telephone.

It also refers only to the money loss to the telephone company resulting from the waste of battery, but the greater loss is sustained by the telephone users in the form of impaired service.

It is a matter of common knowledge that batteries in rural telephones often are not renewed at sufficiently frequent intervals to afford commercial service at all times without repeating, when the user finds it necessary to make or respond to long distance calls.

The telephone company resents, and often rightfully, the too frequent applications for new batteries by its rural patrons, and is sometimes inclined to penalize the rural patron who has exhausted batteries too quickly, by making him do without new batteries until such time as he, in the company's opinion, is entitled to them.

In cases where the user has to furnish his own batteries, renewals are put off even longer, and the frequent result is abominable transmission on rural lines due to the unnecessary early exhaustion of the batteries.

In addition to waste of battery and impaired service, the practice of allowing transmitters to be "live" when a number of parties are merely listening, often produces so much foreign noise on the line that it becomes impossible to understand, even though the talking party's battery be in good condition.

The remedies proposed in times past for the correction of these evils have been numerous, but so cumbersome and unsatisfactory, that they have never been applied to even a small fraction of one per cent of the existing rural telephones.

The Kellogg Switchboard & Supply Company of Chicago is advising telephone companies that it has a remedy in a battery saver that is new and certain in service, is

purely mechanical, can be installed by anyone on any Kellogg telephone, and is the final solution of battery waste. Furthermore, the cost of installing the battery savers is nominal.

The Kellogg battery saver consists of one piece and one attaching screw. The accompanying half-tone views show the Kellogg battery stop attached to the company's

Battery Saver Attached to Long Hookswitch Type Telephone.

new compact type hookswitch, also its older compact telephone. The first stop was designed for the Kellogg new type compact wall set with the short lever hookswitch only.

Code No. 1 stop is for the Kellogg new type short lever hookswitch compact wall set and Code No. 2 stop is for the older style long lever hookswitch wall telephone.

The Kellogg Company will send circulars describing these battery savers on request.

Western Electric in War Time

From the Western Electric News.

Events move quickly in stirring times like these. Since the declaration of a state of war by Congress, each day has had its part in making history—not alone for our country, but for our companies and for their employes.

In President Wilson's inspiring message of April 16, he wrote these words:

It is evident to every thinking man that our industries, on the farms, in the shipyards, in the mines, in the factories, must be made more prolific and more efficient than ever and that they must be more economically managed and better adapted to the particular requirements of our task than they have been, and what I want to say is that the men and the women who devote their thought and energy to these things will be serving the country and conducting the fight for peace and freedom just as truly and just as effectively as the men on the battlefield or in the trenches. The industrial forces of the country, men and women alike, will be a great national, a great international service army, a notable and honored host, engaged in the service of the nation and the world, the efficient friends and saviors of free man everywhere. Thousands, nay, hundreds of thousands of men otherwise liable to military service will of right and of necessity be excused from that service and assigned to the fundamental, sustaining work of the fields and factories and mines, and they will be as much part of the great patriotic forces of the nation as the men under fire.

Congress has as yet given no indication of the provisions it shall make for exempting from military duty certain classes of workers in the industrial army of the United States.

In the plans of the National Defense Council continued emphasis has been given to the necessity for industrial preparedness, and an uninterrupted supply of those products necessary for safeguarding our land from invasion and for equipping our navy and our army with not only ammunition, but the other manifold necessities of warfare.

Early in the development of the national defense plans the American Telephone & Telegraph Company had the privilege of demonstrating to government officials the marvelous degree of co-ordination of the means of communication which it had brought about through the perfection of the country's nerve system—the telephone, together with the wireless telephone.

The Western Electric Company has already been called upon to furnish to the government, telephone and other equipment intended for the use of both the army and the navy. The services of engineers have been requisitioned by the government for the purpose of studying some of the engineering problems with which both branches of the service are confronted. And so it is that both in shops and in laboratories Western Electric artisans and engineers are "doing their bit."

Announcement was made of the appointment of Frank B. Jewett, chief engineer, as major in the Signal Officers Reserve Corps of the United States Army. Mr. Jewett has also been appointed a member of the Physics Committee of the National Research Council. The duties of these two positions have made it necessary for Mr. Jewett to spend much of the past month at Washington. Vice-President A. L. Salt has been named as a member of the Emergency Committee of the American Red Cross, of which Newcomb Carlton, president of the Western Union Company, is the chairman. Mr. Salt is also serving on the New York Advisory Committee on the purchase of army supplies. This committee was appointed by the Chamber of Commerce of the United States at the suggestion of the Council of National Defense to assist the quartermaster's department of the army in the purchase of supplies. The problem of securing supplies for an army being organized on so much larger a scale than ever before has been a difficult one for those in charge of this branch of military work, and this committee of five men of large experience in business and the purchasing of equipment, serving without any compensation, is proving of valuable assistance to the government.

Along with some other corporations the assistance of the Western Electric Company has been sought by one of the states in tabulating the returns from the military census which has been authorized. Thus are the utensils of industry and peace being utilized for one of the preliminary steps in preparation for war. It is a far cry from trench-digging to operating tabulating machines, but both are essential to real preparedness.

In line with the suggestion made by President Thayer last month, there has been very little enlisting of the company's employes in the army or naval militia for active service. Many thousands of employes, recognizing the desirability of some familiarity with military training, have joined the Home Guards or Home Defense Leagues throughout the country, and, in addition, others are studying military tactics through the medium of the college men's training corps and various other voluntary courses of instruction.

The American Telephone & Telegraph Company has given to the United States what is perhaps the finest aux-

iliary signal corps possessed by any army in the world. About 500 engineers have been selected for this work, and many of these have already been sworn into the government service. The work of these men is to plan, set up and operate telephone, telegraph and wireless plants and to assist the regular government corps of men engaged in wireless operation. Other associated telephone companies have organized signal reserve corps among their employes. The disposition among employes of the operating telephone companies has been in this way to retain their positions with a view to enabling the operating companies to provide the country with organized units of trained telephone men when and if they become necessary.

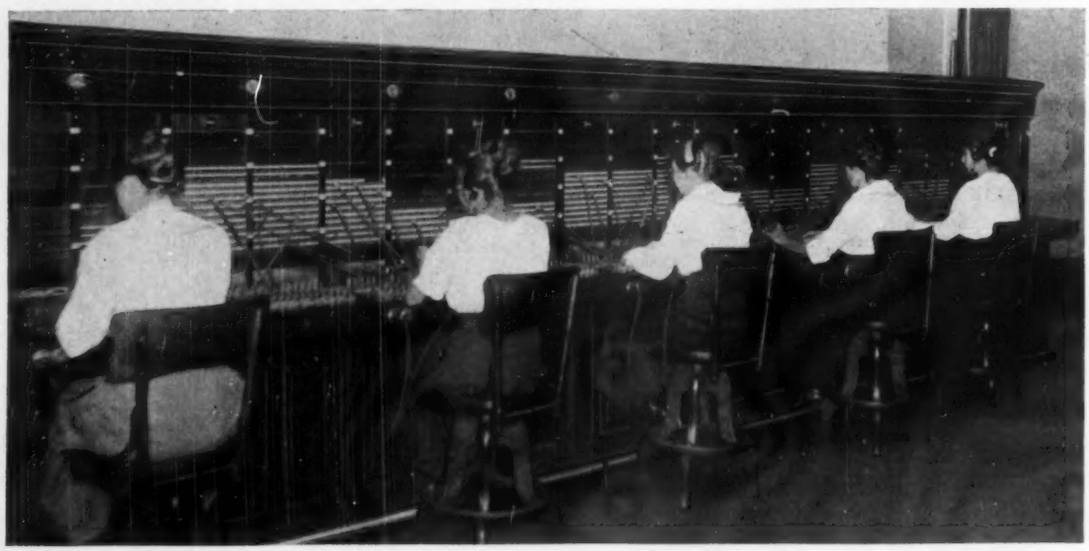
Western Electric people from one end of the country to the other have heard the President's call for a food supply preparedness which begins in each man's own garden. To the already considerable number of tillers of the soil among 30,000 employes will be added this year many thousand more. One Western Electric official in the East is in charge of an extensive project to turn the acres of waste land on his golf course to the profitable production of vegetables. No doubt there are other interesting developments of this food problem, to the solutin of which other Western Electric men are giving their attention.

Low Operating Cost

The latest perfected type of manual switchboard made by the Kellogg Switchboard & Supply Company is an embodiment of those things required by the operating man and approved by the public. The incorporated features, such as automatic ringing and answering, secret service, instantaneous disconnect and recall, are accurate and reliable functions of perfected cord circuits.

This latter feature, analyzed on the basis of a 1,200 line Kellogg switchboard, upon which are incorporated all the latest facilities for efficient and accurate handling of traffic, follows:

Investment in switchboard, main frame, desk, etc.		$17,000
Interest on $17,000 at 6 per cent.	$1,020	
Depreciation at 5 per cent.	850	
Insurance on 80 per cent of value at $1.50 per 100	204	
Taxes on $17,000 at $1.40 per 100.	238	
Cental office repairs (annual)	240	
Telephone repairs (annual)	160	
Investment and maintenance fixed charges		2,712
Chief switchboard man at $100.	$1,200	
Wire chief and main frame man at $75.	900	
Trouble and information clerk at $35.	420	
Total maintenance labor, fixed charge		2,520
Chief operator at $50.	$ 600	
Assistant chief operator at $40.	480	
Local operators (13) at $30.	4,680	
Operating labor, fixed charge		$5,760
Investment and maintenance	$2,712	
Maintenance labor	2,520	
Operating labor	5,760	
Total charge		$10,992
Total number of lines	1,200	
50 per cent, two party	1,200	
25 per cent, three party	900	
Total number of stations	3,300	
Calls per station, per day	7.58	
Total calls per day (average)	25,000	
Total calls per year—300 days	7,500,000	
Total calls per year in 1,000's	7,500	
Cost of calls per thousand (operation)		$ .768
Fixed charge (investment and maintenance), annual, per station		.82
Fixed charge (maintenance labor), annual, per station		.76
Fixed charge (operating labor), annual, per station		1.
Total fixed charge, annual, per station		$3.00



One of the Modern Common Battery Kellogg Switchboards Which Shows a Low Cost of Operation.

Their value to the manager as an inducement to new subscribers and a retaining factor to old ones is not greater than their value to the public as time savers and general dispensers of satisfaction.

The prime factors of importance are: The ease with which an operator is educated; the speed with which she becomes an efficient operator; the quantity of traffic handled by an operator without undue fatigue, and low cost of operation.

The cost of handling calls, $.80 per 1,000 and a total fixed charge of $3 per year per station on the inside plant, are figures which the Kellogg Company believes furnish unexcelled evidence of low cost of operation.

Big Industrial Job for Stromberg

The Scoville Manufacturing Company of Waterbury, Conn., recently placed an order with the Stromberg-Carlson Telephone Manufacturing Company of Roch-

ester, N. Y., for a complete new central office equipment for its factory telephone system. The new equipment will replace an old Stromberg-Carlson installation which has become inadequate to serve the purchaser's needs because of the extraordinary increase in the number of local telephones required.

The order includes a four-position central energy multiple switchboard designed for an ultimate capacity for 1,200 local lines using the associated lamp multiple system in which the line lamps are also multipled throughout the board. For present requirements the initial equipment will provide for the operation of 600 lines. The cord circuits equipments will be arranged for double lamp supervision, ring back keys, automatic listening and operator's barring system on the answering cord.

The Stromberg Company will also furnish and install complete distributing frame and storage battery equipment in connection with the new switchboard.

Stromberg-Carlson 10-A Repeating Coil

There has been greater interest in transmission studies since the war began because the high prices of construction materials, particularly wire, has emphasized the importance of developing high transmission efficiency from all circuits. Many instances have been found where the efficiency gained by the use of copper line wires was sacrificed by the use of inefficient repeating coils in the switchboard apparatus.

One of the high-efficiency repeating coils recently developed by the Stromberg-Carlson Telephone Manufacturing Company is shown in the accompanying illustration. This coil is known as the "10-A" and is said to be particularly advantageous for simplex, composite and phantom circuit work where accurate balancing of the

S-C No. 10-A Repeating Coil.

windings is as important as high efficiency. This is a "talk-through and ring-through" type of repeating coil and in appearance closely resembles a miniature power transformer. The windings are assembled upon a core built up of sheet iron laminations and the whole is enclosed within a cross-talk-proof metal case which is sealed with a moisture-proof insulating compound.

This repeating coil is said to have a transmission efficiency of less than 0.4 miles of standard cable or in other words its introduction in a circuit means a loss equivalent to 0.4 of a mile of standard cable. The Stromberg-Carlson Company will send complete information regarding this apparatus to any interested telephone man.

The War Tax

May 18 the United States Independent Telephone Association, through Vice-President MacKinnon at Washington, issued a circular explaining the war tax bill. This circular we reproduce below without change, although the proposal is now before the Senate. Few material changes are probable.

At this date, May 18, the "bill to provide revenue to defray war expenses" is being considered by the House of Representatives. The bill is not before the Senate but is being considered in advance of its introduction by the Senate Finance Committee. Hearings are being held by this Committee at which opportunity is given interested parties to protest against the provisions of the House bill.

The bill in so far as telephone companies as such are concerned provides:

ADDITIONAL 1916 TAX

1. All corporations, associations and individuals that have paid or are to pay a tax this year on their 1916 incomes shall pay in addition to those 1916 taxes already assessed one-third of such amount, thus making the 1916 tax one-third greater than provided for by Congress under the Act of September 8, 1916.

INCOME TAX ON 1917 INCOME

2. On 1917 incomes, computed and assessed as the 1916 incomes have been, corporations and associations shall for 1917 pay a tax of 4% instead of the 2% provided in 1916.

INDIVIDUAL EXEMPTION

3. Individuals are to pay 4% on their net incomes with additional taxes on amounts over $5,000.00. The exemption for unmarried persons is lowered from $3,000 to $1,000 and for married persons from $4,000 to $2,000.

EXCESS PROFITS

4. The excess profits tax is increased from 8% to 16%. This tax is to be levied on all incomes over the sum of 8% on the actual invested and $5,000. The law providing for the excess profits tax which was approved March 3, 1917, is amended so that the term "actual capital invested" is defined as "(1) actual cash paid in, (2) the actual cash value of the property paid other than cash, for stock or shares in such corporation or partnership, at the time of such payment, and (3) paid in or earned surplus and undivided profits used or employed in the business: Provided, that the good will including trade-marks and trade brands, or the franchise of a corporation or partnership, is not to be included in the actual capital invested, unless the corporation made payment therefor specifiaclly as such in cash or tangible property, the value of such good will, trade-mark, trade brands, or franchise, not to exceed the actual cash or actual value of the tangible property paid therefor at the time of such payment."

CORPORATION EXEMPT

5. Corporations exempt under the September 9, 1916, Act are exempt under this War Tax Bill. Included in these are mutual telephone companiees.

Income derived from dividends upon stock of other corporations or partnerships which are subject to the tax imposed by the bill is exempt from the excess profits tax but not from the regular income tax provided for by the bill.

TAX ON TOLL MESSAGES AND SUBSCRIBER'S RENTALS

6. The bill provides that subscribers to telephone service shall pay a tax of 5% of the amounts paid for rental service and 5 cents on every toll message of 15 cents or more. The paragraphs of the bill providing for these taxes are:

"Sec. 500. That from and after the first day of June, nineteen hundred and seventeen, there shall be levied, assessed, collected and paid * * * a tax equivalent to five per centum of the amount paid for telephone service by subscribers, exclusive of the amounts paid for toll or long distance calls; Provided, that any expense incurred by any person, corporation, partnership, or association, in furnishing such power, light, heat or telephone service for its own use shall not be subject to this tax; (f) a tax of 5 cents upon each dispatch, message or conversation, which originates at any office, station, or exchange, within the United States, of any telegraph or telephone line, which is transmitted over such line, and for which a charage of 15 cents or more is imposed; Provided, that only one payment of such tax shall be required, notwithstanding the lines of one or more persons, corporations, partnerships, or associations shall be used for the transmission of such dispatch, message or conversation."

"Sec. 501. That the taxes imposed by section five hundred shall be paid by the person, corporation, partnership, or association paying for the service or facilities rendered."

"Sec. 502. That no tax shall be imposed under section five hundred upon any payment received for services rendered to officers or employees of the United States, or of any State or political subdivision thereof, in the course of their official business."

"Sec. 503. That each person, corporation, partnership, or association receiving any payments referred to in section five hundred shall collect the amount of the tax, if any, imposed by such section from the person, corporation, partnership, or association making such payments, and shall make monthly returns under oath, in duplicate, and pay the taxes so collected and the taxes imposed upon it under paragraph two of section five hundred and one to the collector of internal revenue of the district in which the principal office or place of business is located.

Such returns shall contain such information, and be made in such manner, as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may by regulation prescribe."

STAMP TAXES

7. On bonds, debentures or certificates of indebtedness issued after June 1, 1917, there shall be paid by stamps a duty of 2 cents for each $100 of face value or fraction thereof. Every renewal or extension shall be taxed as a new issue.

For all stock certificates issued shall be paid taxes amounting to 5 cents for every $100 face value or fraction thereof. The stamps shall be affixed to the stock books and not to the certificates.

For all assignments or transfers of stock or agreements to sell there shall be paid a tax of 2 cents for each $100 of face value or fraction thereof.

Drafts or checks payable otherwise than at sight or on demand and promissory notes and for each renewal or extension of the same, a tax is to be paid of 2 cents for the $100 or less and 2 cents for each additional $100 or fraction thereof.

Proxies for voting at the meetings of corporations or associations are taxed 10 cents each.

Special attention is called to item six, which refers to the proposed tax of 5 per cent on subscriber's rentals and 5 cents a message on all toll messages of 15 cents and over. Both of these taxes are to be collected from the subscriber by the telephone company and are to be charged in addition to the regular telephone rentals and toll charges.

The tax on toll messages is similar to that which was in effect in 1915 and 1916. At that time the telephone companies were required to collect a tax of one cent on toll messages of 15 cents and over. The public became accustomed to the imposition of that tax and the collecting of it, and therefore will be somewhat prepared for this new tax on toll messages.

The tax of 5 per cent on collections from rentals will require explanation and some preparation on the part of the companies. Undoubtedly the bill when passed will embody those taxes. Companies, therefore, should begin to prepare for the collection of them. As soon as the bill is passed proper notice will be sent of that fact and of the time for beginning the collection of the tax. Under the bill as discussed, the date was set for June 1. In all probability, July 1 will be the more likely time for beginning the collection of this tax. There is no certainty in regard to this, however, and companies should be prepared to begin collection of these taxes on very short notice.

When the act has become a law the collector of internal revenue will be asked to issue instructions in regard to these telephone taxes so that all may be thoroughly informed how to proceed and also instructions as to reporting will doubtless be obtained.

Western Union War Instructions

The Chicago department of the Western Union Company has volunteered to instruct men and women operators for the army. This service is held out as enticing particularly to the youth who has not reached military age. Operators for field work will be called out shortly.

City Would Abandon One Line

Following frequent complaints to officials relative to the promised one-line telephone service in Everett, Wash., the opinion was advanced that regardless of the scarcity of equipment for such a consolidation the one-line system could be effected with the co-operation of telephone subscribers.

Commissioner Clay said: "If the people want the one-line system at once it is up to them to use the Independent line, which action would gradually compel the company to abondon the other system. It has been suggested to me, and I believe it an effective plan, that present subscribers to the Sunset install the Independent telephones, thereby curtailing the revenue of the superfluous line."

This course of action to emphasize the demands for the consolidation was favored by Mayor D. D. Merrill and Commissioner T. J. Kelly.

"We realize that the scarcity of equipment renders the use of the one line problematical, particularly with the effect of war on the shipment of materials," declared Mayor Merrill. "Still, the city is of the opinion that the change could be made soon should telephone subscribers follow the plan suggested."

Relative to the suggestion advanced by the city commissioners that the one-line telephone system would be hastened by subscribers using the Independent line only, President W. N. Winter, of the Puget Sound Telephone Company, says:

"If the switchboard capacity at the Independent office had been sufficient to take care of the subscribers served by the Sunset office, the company would have transferred the Sunset subscribers to the Independent office on the first day of last June, when the Sunset property was purchased and thus avoided the expenditure necessary for new equipment. At the present time there are approximately 150 vacant lines on the Independent switchboard which would obviously not go very far in taking care of the 2,000 Sunset subscribers.

"No one is more vitally interested in the physical consolidation of the telephone properties in Everett than the telephone company, as a considerable loss is being sustained because of the excess operating expenses incident to maintaining two exchanges.

"We have already received a large portion of our new equipment and are busily engaged in installing it. The balance is practically completed and we expect it to be shipped the first part of June."

More California Merging

Through negotiations which have led to a tentative understanding between the Pacific Telephone and Telegraph Company and the Union Home Telephone Company, it was learned that one of the most important new telephone mergers to take place in Southern California is well under way.

Upwards of 25,000 subscribers in Santa Ana, Rialto, San Bernardino, Ventura, San Pedro, Long Beach, Highland and other points in San Bernardino and Orange counties will be affected by the consolidation of telephone systems, if the deal is completed.

"It is true that our negotiations have reached an advanced stage and that we may soon bring about a merger of the Home Telephone Company and the Pacific Telephone and Telegraph Company in a number of communities," admitted C. F. Mason, superintendent of the Southern California division.

"Movements have been launched in nearly all of the cities where the union of telephone systems is contemplated, and it was as a result of this demand for a single system that we began our negotiations. There seems every reason to believe at this time the merger will go through, subject, of course, to approval of the proper public officials."

Mr. Mason added that it is impossible to set a date when the telephone systems will be merged, owing to the difficulty of obtaining materials that will be needed for stringing new lines and making necessary changes.

Southern States Convention

The chief topic for discussion at the tenth annual meeting of the Southern States Independent Telephone Association at the Louisville Hotel, Louisville, Ky., May 24 and 25, was the relation of the telephone companies to the government in the present crisis.

The government has clearly defined just what it expects from the telephone companies. They are under orders to furnish men for the Signal Corps, and to keep their plants under the most efficient working order despite the loss of men. "The proposition has been clearly put up to us by the government, to organize and equip an efficient Signal Corps without, in the slightest, disrupting our force," said S. M. Heller, president of the association. "The telephone companies will be expected to work in active co-operation with the telegraph companies."

"America controls 60 per cent of the telephone service of the entire world and we need the co-operation of every telephone company, both large and small, to build up a line of national defense worthy of the United States Government," stated W. S. Vivian, Chicago, who addressed the association in the absence of F. B. MacKinnon, of Washington, who was unable to be present.

"The government today needs 100 men where one year ago it needed but one, and the part telephony will play in the national crisis is no small one," he said. "We have under way two telegraph and eight field battalion companies, consisting of thirteen commissioned officers and seventy-two men, each a specialist in his branch of the work. These are wire, radio and outpost companies. The wire company operates between regimental headquarters and the advance lines, and with these men rest the responsibility of weighing the importance of the message and the rapidity with which it should be sent, thereby holding thousands of lives in their hands. The radio and outpost companies operate in the trenches. So efficient is this service that it is almost impossible for communication to be shut off, for in case of a break the message will jump fifty feet. A census will be taken from each local branch and a copy sent to the secretary at Chicago, where one copy is retained and two forwarded to the War Department at Washington. Arrangements will be made to assist the dependent families of those wishing to enlist, and salaries will be paid up to the time of actual service."

E. B. Fisher, of Grand Rapids, Mich., in a short address stated that the Independents were the democrats of the business and their competitors were the autocrats, An amusing address of welcome was made by C. C. Ousley, from the Publicity League, and Bruce Campbell, an attorney of St. Louis gave an interesting talk on the effect of merger on telephony from a legal standpoint, after which the election of officers took place. J. C. Duncan, of Knoxville, Tenn., was elected president of the association; Terry W. Allen, Corinth, Miss., vice-president, and Minor Corman, of Louisville, secretary and treasurer. The following were elected directors: W. H. Bryant, Mobile, Ala.; Dr. W. L. Moore, Tallahassee, Fla.; J. H. Webster, Fort Valley, Ga.; Albert Parlette, Bristol, Tenn., and S. M. Heller, of Louisville. An automobile ride through all the parks, winding up with a banquet and show at Fontaine Ferry Park was arranged as entertainment for the 150 or more men in attendance.

Since the Galesburg Union Telephone Company, of Galesburg, Ill., has purchased the Bell exchange, the new Bell telephone building in that city will be closed.

The Executive Order of Censorship

Whereas, the existence of a state of war between the United States and the Imperial German Government makes it essential to the public safety that no communication of a character which would aid the enemy or its allies shall be had.

Therefore, by virtue of the power vested in me under the Constitution and by the joint resolution passed by Congress on April 6, 1917, declaring the existence of a state of war, it is ordered that all companies or other persons, owning, controlling, or operating telegraph and telephone lines or submarine cables, are hereby prohibited from transmitting messages to points without the United States, and from delivering messages received from such points, except those permitted under rules and regulations to be established by the Secretary of War for telegraph and telephone lines, and by the Secretary of the Navy for submarine cables.

To these departments, respectively, is delegated the duty of preparing and enforcing rules and regulations under this order to accomplish the purpose mentioned.

This order shall take effect from date.—*Woodrow Wilson.*

The White House, 28 April, 1917.

No Fooling on Camp Wires

The training camp in the San Francisco district has too much telephone activity.

"This matter of incoming telephone calls for the 2,500 members at the training camp is something of a problem, and their wives, sweethearts and business partners or acquaintances will have to understand that they cannot be telephoned to at all hours—unless the matter is vital, in which case a telegram will be the quickest way of reaching a member," said Major L. C. Brown, U. S. A., who practically is chief of staff for Colonel Frederick W. Sladen, U. S. A., the post commandant.

The telephone company is installing a number of pay stations and booths for outgoing calls by the 2,500 members of the training camp during their few—very few—leisure moments.

But Friend Wife, Miss Best Girl, This-is-Bill, and everyone else are given to understand that the Presidio training camp is not a hotel, that there will not be enough orderlies on hand to "page" 2,500 men scattered hither and yon, that the soldiers doing switchboard duty have to abide by orders, that the 2,500 will be quartered some in the east cantonment, some in the main post and some in the west cantonment, and that they practically will not be accessible or at liberty for telephoning until after 5 p. m.

Furthermore, there will be no receiving visitors except between 6 and 8 p. m.—or some such hours, to be definitely decided upon. Also, Major Brown said, there will be no going home or downtown to sleep—except that passes for the week-end probably will be obtainable.

The only telegraph station at the Presidio is as busy as a machine gun in action, and operators are so scarce that they might almost be classified under the head of food shortage. The post telephone exchange is, if anything, just a shade busier than the telegraph.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL ITEMS.

Frank M. Hawkins, one of the pioneers in the panelboard business, has resigned as southeastern sales agent of the Crouse-Hinds Company of Syracuse, N. Y., with offices at 30 Church street, New York City.

E. D. Anderson, advertising manager of the Buffalo division of the New York Telephone Company, is the new president of the Buffalo Ad Club, succeeding William P. Goodspeed, who filled the place during the past year.

Walter D. Dyson, who for the past three years has been manager of the Normal branch of the Kinloch Telephone Company in Illinois, was killed instantly when his body came in contact with a telephone wire charged with 2,200 volts of electricity. He had been called to the east portion of the city in order to locate trouble of an electrical nature. He had climbed a telephone pole on the west side of Oak street, just south of the Alton railroad, and had evidently located the trouble, as he had adjusted his safety strap while working among the wires. When found by men in the neighborhood he was dead and his body remained suspended from the pole until it was removed. The accident was caused by a wire belonging to the Bloomington and Normal Railway and Light Company sagging in such a manner that it rested upon the lines of the telephone company about a half block south of the place where the accident occurred.

E. Thortoner, of Duluth, Minnesota, has arrived in Eveleth in acceptance of a position as local commercial manager for the Mesaba Telephone Company, assuming the position made vacant by the leaving of R. S. Nelson for Fort Snelling, where he has joined the officers' reserves.

James T. Daniels, traffic superintendent of the Columbus, Ohio, district of the Central Union Telephone Company, has been appointed district manager, succeeding D. H. Morris. D. H. Morris becomes division commercial agent for the Ohio division, in charge of advertising, publicity and special contract service, a new department, reporting directly to W. S. Crater, commercial superintendent. Randolph Eide, supervisor of traffic for the Michigan State Telephone Company, becomes traffic superintendent, succeeding Mr. Daniels. Mr. Morris has been district manager for four years, and Mr. Daniels, traffic superintendent for two years.

William H. Howard, division publicity manager of the Bell Telephone Company, Harrisburg, Pennsylvania, has resigned, to engage in business at Bethlehem. He will be succeeded by J. B. Taft, associated with the company's publicity department at Philadelphia.

Edward Flad, consulting engineer, St. Louis, has been appointed to succeed John Kennish on the Public Service Commission of Missouri.

William L. O'Connell has retired as chairman of the Illinois State Public Utilities Commission, having served in this capacity for the past three years.

Noah W. Simpson, secretary to the Governor of Missouri, has been made successor to Howard B. Shaw on the Public Service Commission of that state.

Evan L. Boyle, formerly of Muscotah, but the last year at Hiawatha, is the new resident manager of the North East Telephone Company at Horton, Kansas, succeeding J. N. Cecil.

H. Hall T. Glessner, of the sales engineering department of the Stromberg-Carlson Telephone Manufacturing Company, of Rochester, New York, has been transferred to its Kansas City branch office, where he will continue his work on central energy switchboard sales. Mr. Glessner began his telephone experience with the Western Electric Company, working in the installation department in New York City. In 1909 he went to Denver for the same company in the capacity of assistant experiment engineer; later on he was transferred to Phoenix, Arizona, as general superintendent. In 1912 Mr. Glessner became interested with the Dean Electric Company of Washington, with headquarters in Seattle, and traveled the Northwest in the interests of the above-named concern, which was Northwest distributor for the Garford Manufacturing Company. In December, 1915, Mr. Glessner joined the sales engineering force of the Garford Company and made his headquarters at Elyria until the move was made to Rochester.

Albert S. DeVeau, president of the DeVeau Telephone Manufacturing Company, which was consolidated with Stanley & Patterson, Incorporated, a short time ago, has been elected secretary and a director of the latter concern, and is in charge of its factory sales. Mr. DeVeau has been actively engaged in the electrical business for over thirty years and during that period has been very instrumental in developing the automatic intertalk telephone industry. He was president of the DeVeau Telephone Manufacturing Company for twenty-five years and previous to the organization of that company was associated with the Westchester Telephone Company, J. H. Bunnell & Co., Western Electric Company and the Frederick Pearce Company.

Frank C. Carswell, who has been manager of the State Long Distance Telephone Company at Elkhorn, Wisconsin, the past four years, has resigned, and J. H. Slattery has been elected as his successor. Mr. Carswell has made no definite plans for the future, but it is not likely that he will decide to leave Elkhorn.

John Philip Vollmer, capitalist, died at his home in Lewiston, Idaho, in his seventy-first year. Mr. Vollmer was born in Germany, and came to this country in his early youth, and after his education, which was had at the Northwestern Christian University, now Butler College, he built the first telegraph line in Idaho in 1876. Soon after he built and operated the first practical Bell telephone line on the Pacific Coast in 1878. He was one of the telephone pioneers of America. At the time of his death he was engaged in banking, and was the owner of 300 farms.

Sam C. Sorenson, who for several months past has been holding the position of manager of the Lead office of the Nebraska Telephone Company, has tendered his resignation. He has applied for admission to the officers' reserve corps training camp at Fort Snelling and has received assurances which appear to make it certain that he will be among the 2,500 who will be selected out of the 6,000 which have applied in this district, embracing South and North Dakota, Minnesota, Iowa and Nebraska. His resignation from his position with the telephone company was tendered only after he had been advised so to do by army officers directly connected with the selections being made for Fort Snelling.

Edward Wilmers, of Calumet, Michigan, who has been connected with that branch of the Michigan State Telephone Company for the last thirteen years, has been placed in charge of the Lake Linden, Michigan, office.

F. E. Brumfield, superintendent of service of the local plant of the Ohio State Telephone Company, has tendered his resignation to accept a similar position at Indianapolis. Mr. Brumfield was formerly wire chief for the city plant of the Stark County Telephone Company and has served both companies well. He has been a resident of Alliance the past five years. His successor has not been selected.

David C. Morris, of Cedar Rapids, Iowa, has been appointed local manager of the Iowa Telephone Company, to take the place of Horace S. French, who recently resigned the place to accept the position of cashier of the Hansell Savings Bank.

Gould Williams, of Columbus, Ohio, has been appointed to succeed Chester J. Queen as manager of the Ohio State Telephone Company at Akron. Williams has been in the telephone business for a dozen years, and comes from the offices of the company's president in Columbus. Queen returns to Columbus, where he has been promoted to general purchasing agent for the company.

C. W. Stone has succeeded O. R. Hopkins as local superintendent of the Pioneer Telephone Company at Guthrie, Okla. Mr. Hopkins has been made district superintendent. A. J. Corkins is district superintendent with headquarters at Muskogee.

Angus S. Hibbard, director of the Chicago Telephone Company, was badly injured in an automobile accident Decoration Day, but is reported to be already on the way to quick recovery.

NEWS FROM THE FIELD

ALABAMA.

According to information given out by W. C. Bruce, district manager of the Southern Bell Telephone and Telegraph Company at Montgomery, that company will soon begin construction work on a handsome new building to adjoin the present one on Washington street. It will occupy the space where the brick stable now stands. The property was bought from Dr.

L. L. Hill and wife, Lillie Hill, for the sum of $26,500. The deed was recorded in the office of the probate judge.

CALIFORNIA.

The local telephone company at Tulare has received a new switchboard and equipment of the semi-automatic type which will be installed by June 1. Only one other switchboard of this type is now in use in the state, at Pomona. The call becomes automatic after connections have been made by an operator, and the operator cannot listen in. The system is said to combine the best features of the automatic and manual exchanges.

COLORADO.

Forest rangers of the government are using a telephone system throughout the Rocky Mountain National Park that has just been opened after being built under unusual circumstances. The line was constructed across the Continental Divide in the dead of winter. This telephone line is one of the real freaks of the government service, as the worst 12 miles of it was built in an altitude of 13,000 feet above sea level in the worst months of winter. The rangers worked on snowshoes, scarcely missing a day from their labors on the storm-swept summit of Flattop mountain.

GEORGIA.

The Railroad Commission has approved the telephone company's petition to install a new system and erect a new telephone building in Gainesville.

Authority has just been given for the construction of two copper telephone circuits between Spencer and Atlanta, 314 miles. When this work is completed the Southern Railway will have continuous train dispatching and message circuits between Washington and Atlanta.

ILLINOIS.

The number of telephone "move orders" handled by the Chicago Telephone Company during the "May moving period" was approximately 43,000. The number of May move orders handled last year was 36,300, while in 1915 the number was 33,000. The volume of traffic over the lines of the telephone company is the heaviest in its history.

The annual meeting of the directors of the Stephenson County Telephone Company was held in the offices of the company. Following the directors' meeting officers were elected. The directors elected were Dr. D. C. L. Mease, E. T. Morse, Douglas Pattison, C. L. Best, L. A. Herrick, W. A. Hance, C. D. Knowlton, Jacob Weiss and F. A. Read. The following officers were elected: President, Dr. D. C. L. Mease; vice president, W. A. Hance; treasurer, E. T. Morse; secretary and manager, L. A. Herrick.

The Menard Telephone & Telegraph Company and the Menard Telephone Company filed a joint petition with the state public utilities commission asking for authority for the former to sell to the latter company their property in Greenview and Middletown. The latter company filed an application for a certificate of convenience and necessity to operate in Greenview and Middletown, and another petition asking for authority to issue $6,000 of common stock and $10,000 of preferred stock and $16,000 of first mortgage, six per cent gold bonds.

Decatur Home Telephone Company has been purchased by the Central Union Telephone Company for $327,000.

The Brighton Telephone Company incorporated at Carlinville for service in Macoupin, Jersey and Madison counties.

INDIANA.

The Indiana Telephone and Telegraph Company is putting in $20,000 worth of new cables in various parts of Clinton. The present cable system has been taxed to capacity for some time.

The $20,000 telephone plant at Warsaw, rated as one of the finest in the country, is now in operation.

The Royal Center Telephone Company, Royal Center, Ind.; capital, $20,000; telephone lines and exchanges; directors, William B. Ford, Bertha Ford, George S. Akers.

Akers Telephone Company, Wingate, Ind.; capital, $20,000; telephone lines and exchanges; directors, George S. Akers, Mary Akers, Harley T. Ristine.

Johnson Telephone Company, Greenfield, Ind.; capital, $150; telephone lines and exchanges; directors, Charles E. Johnson, Lewis Hagans, John McClarnon.

IOWA.

Contracts were let in Des Moines for the immediate construction of an office building in Ames which will be used by the Iowa Telephone Company as a home for the local exchange. The contract for the building went to W. J. Zitterell of Webster City, who will construct the building for $25,700.

KANSAS.

The installation of an entirely new common battery system to cost in the neighborhood of $85,000 and to be completed by August the first, was announced by L. F. Dugan, division commercial superintendent of the Southwestern Bell Telephone Company at El Dorado and Charles F. Parker, local superintendent. Mr. Dugan states that estimates have been accepted for some time but pending definite assurance from the manufacturers regarding time when material could be secured, no announcement of plans was made. In addition to the new system three additional long distance wires will be strung from El Dorado to Wichita giving better service to the south and southwest. The telephone company has been handicapped in the handling of the increase in business in El Dorado since the oil boom.

The Corinth Mutual Telephone Company has placed an order for 1,500 poles and 100 miles of wire to be used in constructing new lines for the company at Downs. It has been endeavoring for many months to purchase the lines south of town from the United Telephone Company, and failing in this have decided to build its own lines. In all there will be thirteen lines constructed. They will extend to the city limits of Downs and attach to the switchboard of the United Telephone Company.

MICHIGAN.

The Postal Telegraph Company has unloaded material on North Monroe and West Front streets for the work of placing underground all wires and cables, as ordered in the recent supreme court decision handed down in favor of the city of Monroe. The wires will be placed underground from the corner of East Elm avenue and North Monroe street, south to Front street, and west on Front street to the alley west of the Postal Telegraph office. The Stoddard Telephone Construction Company will be next affected by the order, having been notified recently by a commission resolution to place wires underground, and remove poles from the streets.

The Michigan State Telephone Company will expend considerably more than $50,000 in the district immediately surrounding Iron Mountain during the next several months. L. Green, the construction superintendent, will make his headquarters at Iron Mountain and will employ between thirty and forty men. The work includes four new lines from Iron Mountain to Norway, four from Iron Mountain to Crystal Falls, and two from Iron Mountain to Marquette along the county road. Several more wires are also to be erected between Iron Mountain and Powers. The service is now very much congested and the additional wires have become absolutely necessary in order to handle the business.

H. S. Pratt, of the commercial department of the Michigan State Telephone Company has been in Kalamazoo making a survey of the city and the business prospects for the future. This work is done in connection with future developments of the Michigan Telephone properties in Kalamazoo. Cable work to the value of $125,000 is to be done to improve the service in this city. It is possible this amount may be increased as a result of the industrial survey. "Kalamazoo is one of our reliable, steady growing centers," said Mr. Pratt. "We can always count on an increase here. It runs right along from 550 to 750 telephones annually. Even in the bad years that have just passed, our business showed an increase. In 1914 and 1915 we installed over 400 instruments in Kalamazoo."

A crew of eight men of the Michigan Telephone Company is stringing a copper circuit from Menominee to Escanaba, and doing repair work in Menominee and Marquette.

KENTUCKY.

The Greenburg and Thurslow Telephone Company, Thurslow; capital, $60,000; incorporators: E. Perkins, W. B. Helm, L. C. Taylor.

MINNESOTA.

W. A. Schreiter & Son, owners of the Red Lake Falls Telephone Company, are rebuilding the entire telephone system of Red Lake Falls. Several carloads of poles have been unloaded and work has commenced on the wires and cables. A. Halseth of St. Paul is the contractor in charge of the work.

MONTANA.

A representative of the Northern Telephone Company interviewed the business men of Bainville in regard to establishing an exchange and practically every business house agreed to install a telephone, as well as a great many residences, and as a consequence it is very likely that the exchange will be forthcoming in the very near future. Should the company decide to locate at Bainville the work will be pushed rapidly, and it is thought the exchange will be in operation within three months' time, providing the company is not held up on account of not being able to secure the necessary material and labor. It is understood that the Lanark farmers' line will also be run to Bainville to connect with this proposed exchange.

NEW YORK.

An agitation has been started by Babylonians and city residents with cottages on Oak Island and Oak Beach to have telephone service installed on the beach to connect with the mainland and thence by switchboard to all points now reached by

Babylon subscribers. In the past there has been desultory talk at the beginning of each summer season with beach telephones in view, but the movement has never been strong enough to survive. The time, it is expected, a general agitation will result and the Public Service Commission will be prevailed upon to order the installation of the service. The movement was started by F. M. Lieman of 502 East Eighth street, Brooklyn, a summer resident of Oak Island Beach.

The New York Telephone Company will erect a two-story brick exchange at 943-945 Hertel avenue, Buffalo, according to plans filed with the bureau of building. The structure will cost $115,600.

NORTH CAROLINA.

While the deal has not been completed, it is understood that the Home Telephone and Telegraph Company has completed arrangement for the purchase of the vacant lot at the southwest corner of Broad and Hancock streets, New Bern, owned by E. H. Meadows, and at at an early date will begin the erection there of a modern brick building in which the offices and exchange will be located.

OHIO.

On Wednesday, May 2, the Pennsylvania Lines adopted telephone service for dispatching their trains from Fredericksburg. Two telegraph lines were retained, one for Western Union messages and one for general use.

The Central Union Telephone Company is planning the erection of a fire-proof exchange at Geneva and Arlington avenues, Toledo. It will represent an outlay of $110,000, with an additional expenditure of $60,000 for outside connecting facilities, District Manager A. J. Mellen announces. It will be known as the Broadway exchange and will substitute for the temporary exchange at South and Hawley streets. It will have an ultimate capacity six times that of the temporary Broadway branch.

OKLAHOMA.

The Pioneer Telephone Company of Ardmore has purchased an additional lot adjoining a former purchase and has a concrete foundation laid for a two-story brick building which will be the home of the telephone company for the Healdton oil district. The newest flash light system will be installed. Three wires will be built into Ardmore, and one each to Oklahoma City, Wilson, Ringling, Waurika, and a cable to Wirt.

TEXAS.

Charter amendment filed by San Angelo Telephone Company, San Angelo, increasing the capital stock from $80,000 to $400,000.

Announcement was made by officials of the Pioneer Telephone Company that the company would spend $35,000 at Durant immediately in improving its equipment. The central station will be moved to temporary quarters at once and work begun on the improvements. A new switchboard will be used, having a capacity of about 4,000 telephones.

UTAH.

Construction of a telephone line across the desert, and its availability for war purposes, were taken up before the public utilities commission in the form of an application for a reduction in rates. The Western Pacific was authorized to install a rate of 10 cents per car per mile for outfit cars between Timpie and Wendover, to assist in the construction of such a telephone line.

WISCONSIN.

The Ashland Home Telephone Company and the Wisconsin Telephone Company will be obliged to establish physical connection at Ashland. This was the order issued by the railroad rate commission. In addition to the regular toll charge an extra charge for a call through one exchange to the other will be made.

A. C. Winkelman of Milwaukee is busy at the Wisconsin Telephone exchange doing preparatory work for the installation of the common battery system. The switchboard, which was in the northeastern room of the building will be moved to the large room on the south side of the building and the room vacated will be for batteries and wiring. It will be several months before the system will be in working order.

In addition to the West exchange of the Wisconsin Telephone Company on Twenty-sixth street, between Cedar and States streets, Milwaukee, will be built. It will be one-story high, 26x30, of brick and mill construction.

Telephone Courses at Dunwoody Institute

One of the most interesting features of the recent annual convention of the Minnesota Independent Telephone Association was the address delivered by Dr. C. A. Prosser, Dunwoody Institute, Minneapolis, regarding the course in telephony now being offered through the institute.

He jolted many of those present into a realization of what they are overlooking by the statement that Independent telephone companies have taken practically no advantage of the Institute's facilities. Other operating companies, he said, realize that it pays to have their employes take up one or more of the courses.

Four reasons were given by Dr. Prosser as a possible explanation for the lack of students from Independent exchanges. The first that the Independent companies do not know of the work; second, that they do not believe in it; third, that they cannot control the situation and, fourth, that they are not onto their jobs.

The work in telephony is divided into unit courses, which are as follows:

1. General science course in telephony.
2. The mathematics of telephone work.
3. Substation course No. 1.
4. Substation course No. 2.
5. Private branch exchange No. 1.
6. Private branch exchange No. 2.
7. Cable course No. 1.
8. Cable course No. 2.
9. Exchange aerial construction No. 1.
10. Exchange aerial construction No. 2.
11. Exchange underground construction. (Not prepared.)
12. Toll line construction. (Not prepared.)
13. Central office equipment—Course No. 1.
14. Central office equipment—Course No. 2.
15. Central office equipment—Course No. 3. (Not prepared.)
16. Central office power plant. (Not prepared.)
17. Testing course.
18. Automatic telephony—the 100-line system.
19. Automatic telephony—The use of non-numerical switches.
20. Automatic telephony—The multi-office system.

Each course cost $500 to prepare.

The first—the general science course—is required of all students, after which any of the other courses may be selected.

The instruction is free to all students in the state, a small charge being made to cover the cost of printing the lesson sheets and the mailing. For the first unit course—the general course on the science of telephony (12 lessons)—the student pays $1 as a registration fee, which covers all the courses, and $1 for the lesson sheets of the course. All the other unit courses will cost $1 each.

Eight unit courses are required to complete any general course leading to a diploma. The cost for these courses would therefore be $9 in all, $1 for the registration fee, paid only once, and $1 for each of the eight unit courses. This would make the actual cost less than 10 cents per lesson. The charge for each unit course is to be paid in advance.

Dr. Prosser, in closing, expressed his desire to cooperate with Minnesota Independent telephone men and then called upon A. M. Emerson, director of the extension work of the institute, who briefly told of the work which has been done. He stated that 150 students are just finishing the first course in telephony which is required of all students. After the completion of this course, other courses may be taken.—Tristate's *"Our Emblem."*